Section B: Greater Monterey County Region Description

B.1 REGIONAL BOUNDARY

B.1.1 Description of Greater Monterey County IRWM Regional Boundary and its Relation to Neighboring Regions

The Greater Monterey County Integrated Regional Water Management (IRWM) region includes the entirety of Monterey County exclusive of the Pajaro River Watershed IRWM region and the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region established under Proposition 50. The Greater Monterey County IRWM region also includes a small portion of San Benito County where the Salinas River watershed extends outside of Monterey County. Generally, the region includes the entire Salinas River watershed north of the San Luis Obispo County line, all of the Gabilan and Bolsa Nueva watersheds in the northern part of the county, and all of the coastal watersheds of the Big Sur coastal region within Monterey County.

Areas within Monterey County that are not represented in this IRWM Plan (but that are represented in other IRWM Plans) include: the Pajaro River watershed, represented in the Pajaro River Watershed IRWM Plan; and the Carmel River watershed, the San Jose Creek watershed, areas overlying the Seaside Groundwater Basin, and all areas within the Monterey Peninsula Water Management District jurisdictional boundary (including the Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks, Pacific Grove, Monterey, Sand City, and Seaside), which are represented in the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Plan.

The Greater Monterey County IRWM region lies entirely within the Central Coast Regional Water Quality Control Board (RWQCB) district and is part of the IRWM Central Coast Funding Area. Adjacent IRWM regions include:

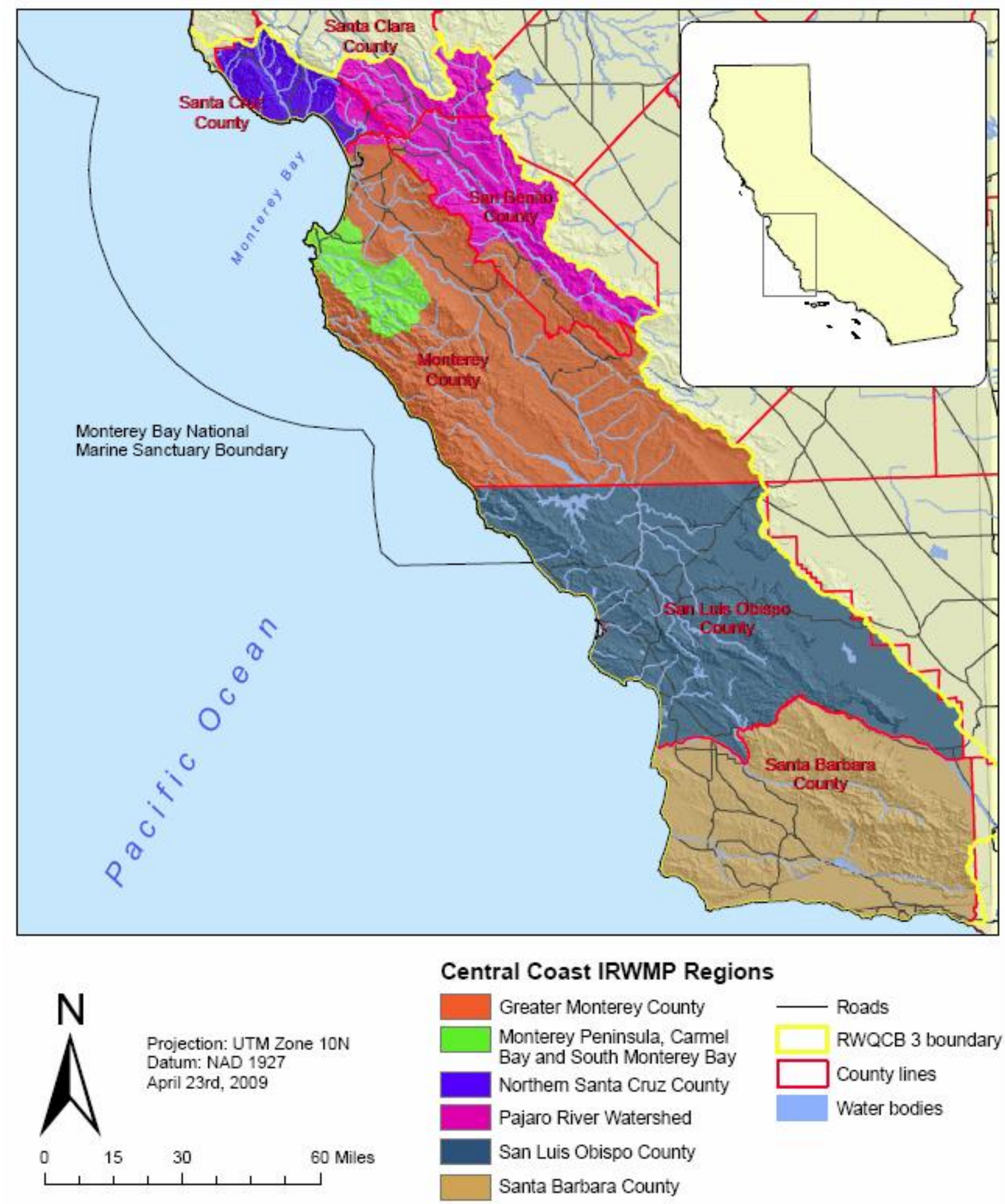
- Pajaro River Watershed IRWM region
- Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region
- San Luis Obispo County IRWM region

Together these four regions, plus the Northern Santa Cruz County and the Santa Barbara County IRWM regions, form the Central Coast IRWM Funding Area. The Greater Monterey County Regional Water Management Group (RWMG) works cooperatively with neighboring IRWM regions to identify and coordinate inter-regional water resource management issues, and participates in periodic meetings with representatives from each of the six Central Coast IRWM regions to discuss region-wide IRWM issues. Please see Section Q, Coordination, for a more detailed description of how the RWMG communicates and coordinates with the other IRWM regions.

The maps on the following pages illustrate the Greater Monterey County IRWM Region. Figure B-1 shows the region in context with county boundaries, water agency boundaries, and cities and large communities. Figure B-2 shows the region in context with the other five IRWM regions in the Central Coast IRWM Funding Area.

Figure B-1: Greater Monterey County IRWM Region

Figure B-2: Greater Monterey County IRWM Region in Context with the Other Central Coast IRWM Regions



B.1.2 How the Boundaries were Determined and Why the Region is Appropriate

The Greater Monterey County IRWM region is based on watersheds, groundwater basins, jurisdictional boundaries, existing partnerships, and historical planning efforts. As noted earlier, the IRWM Plan for the Greater Monterey County region represents an expansion and modification of a former plan—the Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan (FEP)—that was developed by the Monterey County Water Resources Agency (MCWRA) in May 2006. The new Greater Monterey County region encompasses service areas of multiple local agencies and will promote significant opportunity for integration of water management activities related to water supply, water quality, environmental stewardship, groundwater management, and flood management. Expanding the Salinas Valley IRWM FEP boundary has served to make the region more inclusive, inviting more partners and stakeholders to the table and opening up new opportunities for cooperation and integration of efforts.

Expanding the Salinas Valley IRWM FEP boundary has also served to eliminate previous IRWM Plan coverage voids. As noted above, the new regional alignment includes key areas that have not been previously covered in any other IRWM Plan. These include, specifically: the Big Sur coastal watersheds and communities on the western side of the Santa Lucia Range, from Pt. Lobos south to the San Luis Obispo County line; the larger Salinas River watershed from the Salinas River National Wildlife Refuge at the Pacific Ocean south to the San Luis Obispo County line and including the east and west ranges of the valley; the Gabilan watershed; and portions of western San Benito County.

The Greater Monterey County region, as defined above, is appropriate for IRWM planning because: it provides complete coverage of important watersheds that had not been represented in prior IRWM plans; it aligns with historical water resource management and existing partnerships in the area; and it provides considerable opportunity for further cooperation and integration of water resource management efforts in the region. The Greater Monterey County region was approved by the California Department of Water Resources (DWR) in May 2009 as an IRWM planning region through the Regional Acceptance Process.

B.2 REGIONAL OVERVIEW

This section offers a brief overview of the Greater Monterey County region in terms of its physical setting, social and cultural values, and economy in order to provide context for the water resource system and management in the region.

B.2.1 Physical Setting

The Greater Monterey County IRWM region lies almost entirely within Monterey County on the central California coast, 110 miles south of San Francisco and 320 miles north of Los Angeles. Monterey County has approximately 105 miles of coastline and is bordered by Santa Cruz County to the north, San Luis Obispo County to the south, and San Benito, Kings, and Fresno Counties to the east. Elevation within the county ranges from sea level to 5,862 feet at Junipero Serra Peak, which is located 12 miles inland in the Santa Lucia Range.

Monterey County is famous for its spectacular Big Sur coast, mild year-round weather, and for the Salinas Valley, one of the most productive agricultural regions in the world. Prominent land features in the county include two major northwest-southeast trending mountain ranges—the Santa Lucia Range along the coast, and the Gabilan Range along the county's eastern border, both of which are part of the Pacific Coast Range. Cradled in between the Santa Lucia and Gabilan mountain ranges is the gentle expanse of the Salinas Valley; and at the center of the Salinas Valley flows the Salinas River, the largest river on California's Central Coast.

At the northern coastal end of the Greater Monterey County region, between the Pajaro Valley and the Salinas Valley, is an area known as “North County.” North County extends from the Pajaro River southward to Espinoza Road and the mouth of the Salinas River. All of the North County area is included within the Greater Monterey County IRWM region except for the area that lies within the Pajaro River watershed. North County has a more undulating topography than the Salinas Valley, and much of the land is cultivated in agricultural crops. The coastal area of North County contains wide sandy beaches and the primary commercial fishing harbor for the entire county.

The Santa Lucia Mountains have been described as “a chaos of ridges and canyons” bordering the Pacific Ocean (Henson and Usner 1993, p. 8). The Santa Lucia Range stretches approximately 100 miles from just south of Carmel to a point north of the San Luis Obispo County line, and extends as much as 20 miles inland. Along the coast is a single main ridge, the Coast Ridge, which is actually a jumble of narrow spur ridges separated by deep canyons that run perpendicular to the ocean. The steepest slope in the contiguous United States occurs within the Coast Range at Cone Peak, ranging from sea level to 5,155 feet in a distance of just three miles. The jagged peaks, steep slopes, and narrow coastal canyons of the Coast Ridge are what have made the Big Sur coastline so famous, attracting some three million visitors each year. The geologic drama continues out of view of most tourists, as the steep ridges of the Santa Lucia Mountains continue to fall sharply beneath the Pacific Ocean. Just 50 miles offshore, the Pacific Ocean reaches a depth of 12,000 feet. Two deep submarine canyons—the Sur Submarine Canyon and the Partington Submarine Canyon—cut into the continental shelf near the Big Sur coast, and eventually merge to become one of the deepest submarine canyons on earth (ibid.).

On the eastern side of the Santa Lucia Range, the mountain slopes descend abruptly down to the Salinas Valley. The Salinas Valley, famous for its productive soils, is a broad gentle basin filled with several thousand feet of sediment that has been captured over the millennia from the surrounding mountains. The valley is 130 miles long, 10-20 miles wide, narrowing to only about 3 miles wide in its southeastern end and rising in altitude from sea level at the Monterey Bay to approximately 400 feet near Bradley, and containing about 640,000 acres of broad bottomland (MCWRA 2008, p. 10; Monterey County Planning Department 2010b). Wending its way along the floor of the Salinas Valley is the Salinas River, extending about 155 miles from its headwaters at the Santa Margarita Reservoir in San Luis Obispo County and flowing north to its mouth at the Monterey Bay. The river drains approximately 4,043 square miles of land.[1]

The Gabilan Mountains, like the Santa Lucia Mountains, are composed of granite and metamorphic rocks and are similarly characterized by steep slopes and complex drainage patterns. The Gabilans, however, are drier than the Santa Lucia Mountains, being located further inland in the rain shadow of the Santa Lucia Range. The Gabilan Range includes several mountain peaks over 3,000 feet, the highest being North Chalone Peak (3,304 feet) located in Pinnacles National Monument in the southern portion of the range (Monterey County Planning Department 2010b).

The climate in Monterey County is considered Mediterranean, with dry summers, rainy winters, and moderate temperatures year-round. Precipitation in the region falls mainly between November and April. Marked variations exist in rainfall amounts between the Big Sur coast and inland areas, as well as from year to year and from sea level to altitude along the coast. Average annual rainfall is 15 inches in the City of Salinas and 11 inches in King City in the Salinas Valley, whereas at Pfeiffer Big Sur State Park near

[1] This statistic is from Newman et al. 2003 (CSUMB Watershed Institute Land Use Mapping report). There is some discrepancy between various plans regarding this number: Monterey County 2010 General Plan EIR claims the drainage area to be 3,950 square miles, the Monterey County General Plan claims it to be 3,300 square miles, the Monterey County Groundwater Management Plan 5,000 square miles, and the Salinas River Management Plan 4,600 square miles.

the coast annual rainfall averages about 42 inches (with a low on record of 18 inches in 1990 and a high of 89 inches in 1983), and at higher elevations in the Santa Lucia Mountains precipitation is substantially higher (e.g., average annual rainfall is 78 inches at Mining Ridge at an elevation 4,760 feet, with an annual low on record of 44 inches in 1987 and an annual high of 173 inches in 1983) (Henson and Usner 1993, p. 44).

B.2.2 Social and Cultural Values

The existing social and cultural values in Monterey County have been very much shaped by the landscape, as well as by the three major cultural groups that have occupied the region: American Indians of the Costanoan (Ohlone), Esselen, and Salinan groups; Spanish-Mexicans; and Americans (Gordon 1996; Henson and Usner 1993).[2] Spanish explorers first sailed past the Monterey/Big Sur coast in the mid-1500s, but did not land in Monterey Bay until the early 1600s. The Franciscan missionaries began constructing their missions in the late 1700s, establishing missions in Monterey (1770, then moved to Carmel in 1771), in the San Antonio River Valley (1771) along the eastern side of the Santa Lucia Mountains, and in Soledad (1791) in the central-southern Salinas Valley. The American Indians were both voluntarily and forcibly brought into the missions by the Spanish (Monterey County Planning Department 2010b).

The Indian populations were ultimately decimated due to introduced European diseases, particularly whooping cough and measles, and by violence in the missions and declining birth rates (e.g., the Costanoan population was estimated to be 11,000 at the time of the first European arrival, and by 1920, only 56 survivors remained). In 1826, after Mexico's secession from Spain, the governor of Alta California emancipated the Indians from the missions. A small number of their descendants still live in the region. The Ohlone Costanoan Esselen Nation, a recently founded group with a membership of about 500 based in the Carmel Valley region, has been petitioning the federal government to regain recognition as a formal Federally Recognized Tribe (ibid.).

Spanish occupation of the Monterey County region significantly expanded the grasslands, especially in the Salinas Valley, to support an economy based primarily on cattle grazing. While the few gardens that existed were localized mainly around the missions, they are significant for having introduced certain Old World crops to the region, including wine grapes, and olive, apple, and pear trees. The Spanish also left a legacy of place names in Monterey County, for example Salinas, which means "salty marsh" in Spanish (Gordon 1996, p. 56).

In 1833, the Spanish missions were secularized and the extensive mission lands were distributed by the Mexican government to Spanish-speaking settlers as land grants, or ranchos. The boundaries of these

[2] Source for map: www.MTYcounty.com. Used by permission.

ranchos are still clearly evident, shown on aerial photographs where field strips, furrows, and plant rows abut at different angles on opposite sides, or marked by the edges of chaparral tracts (ibid, p. 61). The boundaries of the original ranchos serve to a large extent as today's property boundaries within the region, particularly on the larger tracts of agricultural and ranching lands. Many of the ranchos have continued as working ranches to the present day, not only in the Salinas Valley but along the Big Sur coast as well.

Americans began settling in Monterey County in the 1800s during the period of Mexican control. The discovery of gold in the Sierra Nevada foothills in 1849 brought droves of homesteaders to the county, and as the best parcels in Monterey and the Salinas Valley became occupied, homesteading spread to the rugged Big Sur coast. Many of the first American settlers were cattlemen like the Spanish before them, and sheep were raised in large numbers, both in the Salinas Valley and in the hills of the Big Sur coast. Grazing eventually gave way to irrigated agriculture. By 1870, commercial agriculture was well underway in the Salinas Valley. A major drought in 1863 and 1864 essentially wiped out the cattle industry, and grain production became the county's principal agricultural activity. Sugar beet cultivation and dairying began to replace grain farming by 1897. The extension of the Southern Pacific Railroad from Pajaro to Salinas, along with improved irrigation systems, refrigerated freight cars, and other innovations in technology, encouraged more and more intensive row crop cultivation and set the stage for the Salinas Valley to become one of the most productive agricultural regions in the world (Monterey County Planning Department 2010b).

Today, agriculture dominates the lifestyle and permeates cultural and social values in the Salinas Valley. Agriculture is unique in the Central Coast region compared with agriculture in other parts of the state, such as the Central or Imperial Valley, since the majority of operations in the Salinas Valley are less than 50 acres and many properties have been held in families for many generations (Casagrande and Watson 2005). Monterey County and the Salinas Valley in particular celebrate this agricultural lifestyle with numerous events throughout the year, including the Castroville Artichoke Festival, the Salinas Valley Fair, the Harvest Festival in Greenfield, the Great Wine Escape, and the California Rodeo Salinas (the 100th rodeo was celebrated in July 2010). The region also honors its most famous literary celebrity, John Steinbeck, who wrote lyrically about the Salinas Valley and Monterey County in many of his books, with the National Steinbeck Center located in the City of Salinas and the annual Steinbeck Festival.

Along the Big Sur coast, social and cultural values have developed as an expression of that region's unique geographic landscape and related social history. When the Spanish missions were secularized in 1833, two large land grants (ranchos) were made in the Big Sur coastal area, one of which, El Sur Ranch in the Point Sur area, is still in part a working ranch today (Henson and Usner 1993). The discovery of gold in the Sierra Nevada in 1849 brought an influx of homesteaders to the Big Sur coast, and from the 1860s to the early 1900s a loose-knit community of pioneers established themselves among the rugged and isolated canyons and hillsides of the coast. They initially carved out a rough living for themselves, hunting, fishing, and foraging for food along the coast much like the natives before them, and eventually came to raise cattle and pigs and grow much of their own food. Small-scale industries, such as tanoak harvesting, and limestone and gold mining, were established but were generally short-lived.

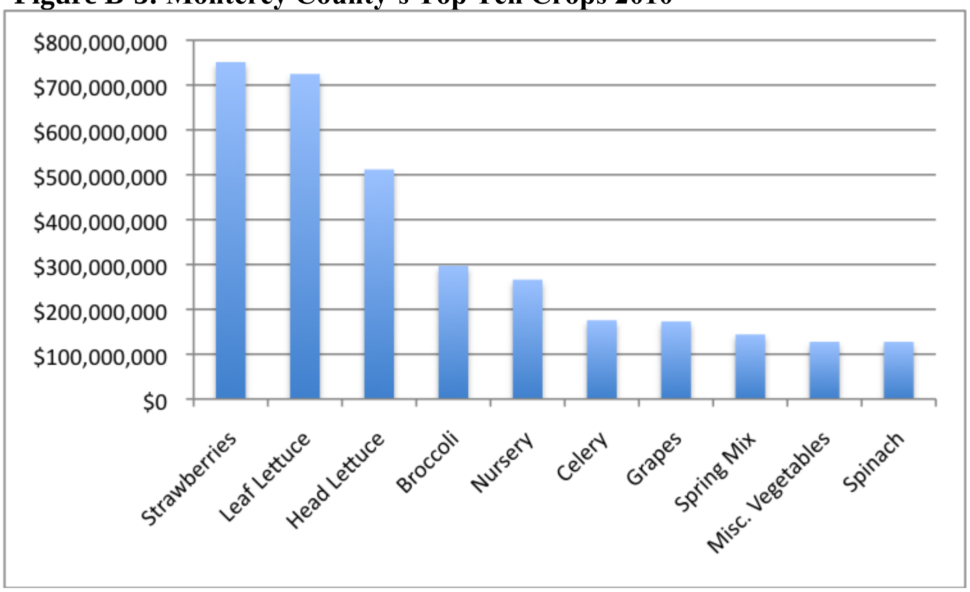
The completion of Highway One in 1937 paved the way for a different type of settler in Big Sur, opening up the wild and dramatic coast to those seeking adventure and inspiration. Artists, artisans, and writers—such as Robinson Jeffers, Ansel Adams, and Henry Miller—came to visit and many to settle in the region, creating a strong cultural identity for which the Big Sur region is still known today. It is a cultural identity and ethic born of the landscape, one that continues to express the fierce independence and pioneering spirit of the early American settlers, as perhaps of the native people who inhabited the land for some 2,500 years prior, despite the considerable changes in actual lifestyle (ibid.).

B.2.3 Economic Overview

Agriculture dominates the economy of Monterey County, accounting for 27 percent of the county's workforce (Beacon Economics 2011) and generating over $4 billion in 2010 (Monterey County Agricultural Commissioner's Office 2011). A recent report produced by the Monterey County Agriculture Commissioner's Office (2012) claims that, when both the farm and food-processing sectors plus their multiplier effects are taken into account,[3] Monterey County agriculture actually contributes a total of $8.2 billion to the local economy, including $5.1 billion in direct economic output and $3.1 billion in additional economic output in the form of expenditures by agriculture companies and their employees.

Farm employment has remained strong throughout the recession. A weak dollar has led to a boost in agricultural exports from Monterey County, translating into an increased demand for labor. The county supplies the United States and the world with strawberries, lettuce, nursery crops, broccoli, wine grapes and numerous other crops, including 59 percent of the nation's lettuce, 53 percent of the nation's broccoli, and 30 percent of the nation's strawberries.[4] The Salinas Valley accounts for most of the agricultural production in the county. Because of the intensity of agricultural production, Salinas Valley has been dubbed the "Salad Bowl of the World." The Salinas Valley is also an important viticultural area, with eight American Viticultural Association appellations located in the region in addition to the overall "Monterey" appellation. Figure B-3 shows the county's top ten crops, and Figure B-4 shows revenues and acreages for the county's major crop categories in 2010.

Figure B-3: Monterey County's Top Ten Crops 2010



Source: Monterey County Agricultural Commissioner 2010 Crop Report

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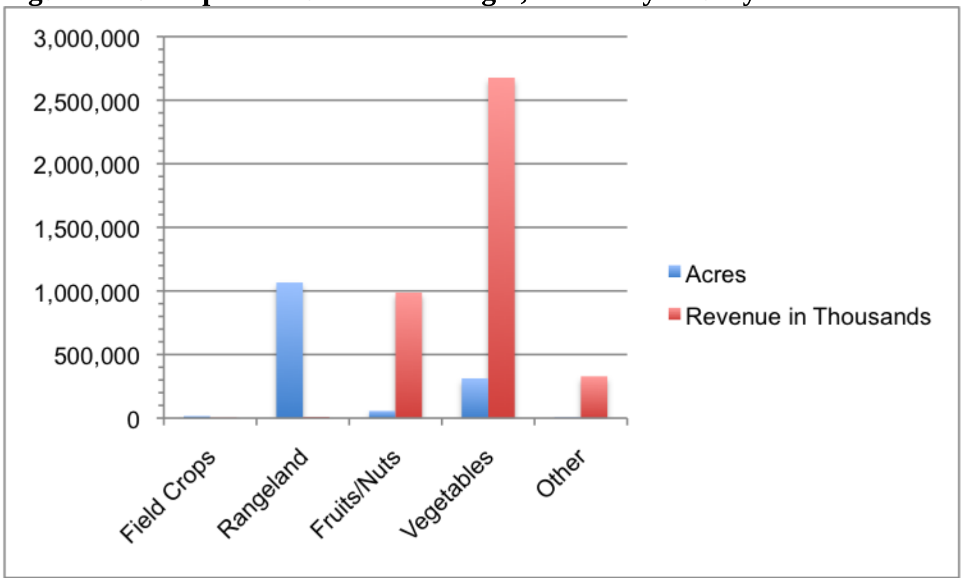
[3] The multiplier effects of agriculture take two forms: *indirect effects* and *induced effects*. Indirect effects consist of "business to business" supplier purchases; for example, when a grower buys farm equipment, fertilizer, seed, insurance, banking services, and other inputs. Induced effects consist of "consumption spending" by agriculture business owners and employees, for example when they buy housing, healthcare, leisure activities, and other things for their households. (Monterey County Agricultural Commissioner's Office 2012)

[4] This information is based on the Monterey County 2010 Crop Report, the USDA Noncitrus Fruits and Nuts 2010 Summary, and the USDA Vegetables 2010 Summary.

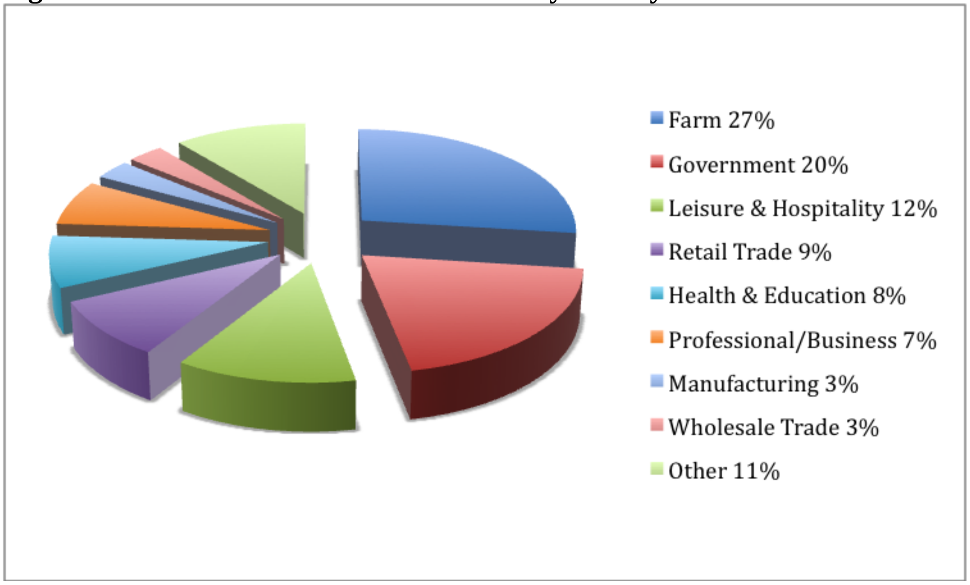
Figure B-4: Crop Revenues and Acreages, Monterey County 2010



Source: Monterey County Agricultural Commissioner 2010 Crop Report. Note: Gross revenues for Vegetables in 2010 totaled $2,677,072,000. Rangeland (which in the Crop Report is included in the "Field Crops" category) totaled 1,066,494 acres and accounted for $10,665,000 in gross revenue. Most of the gross revenues produced in the "Fruits and Nuts" category came from strawberries ($751,114,000) and from wine grapes ($172,916,000). "Other" includes the crop categories of Seed Production, Cut Flowers & Cut Foliage, and Nursery Products.

Following farm-related employment, government is the second largest employment sector in the county, accounting for 20 percent of the county's workforce in 2010. Many of the public sector jobs are associated with the State correctional facilities in Soledad. Leisure and retail trade follow as the county's next largest employment sectors, accounting for about 12 percent and 9 percent of the county's workforce respectively. Figure B-5 illustrates the distribution of Monterey County jobs in 2010 in the various employment sectors (Beacon Economics 2011).

Figure B-5: Distribution of Jobs in Monterey County 2010



Source: 2011 Monterey Economic Forecast (Beacon Economics 2011)

In the Big Sur region, the economy is based mainly on tourism and public services (including U.S. Forest Service, State Parks, and military employment). An estimated 3-4 million visitors come to Big Sur each year to enjoy the spectacular views, the State Park trails, National Forest wilderness areas, and rugged coastal beaches. Other economic activities in the Big Sur region include ranching and a small amount of gold mining. Development in Big Sur is naturally constrained by the rugged mountainous terrain, limited availability of water, unstable soils on steep slopes, and dangers of fire and flood. Given these constraints, along with the strict land use regulations mandated by the County's Local Coastal Plan for the Big Sur Coast (1981), development is not expected to rise sharply or change significantly in the foreseeable future. Primary employment will most likely continue to be in the tourist and public sectors.

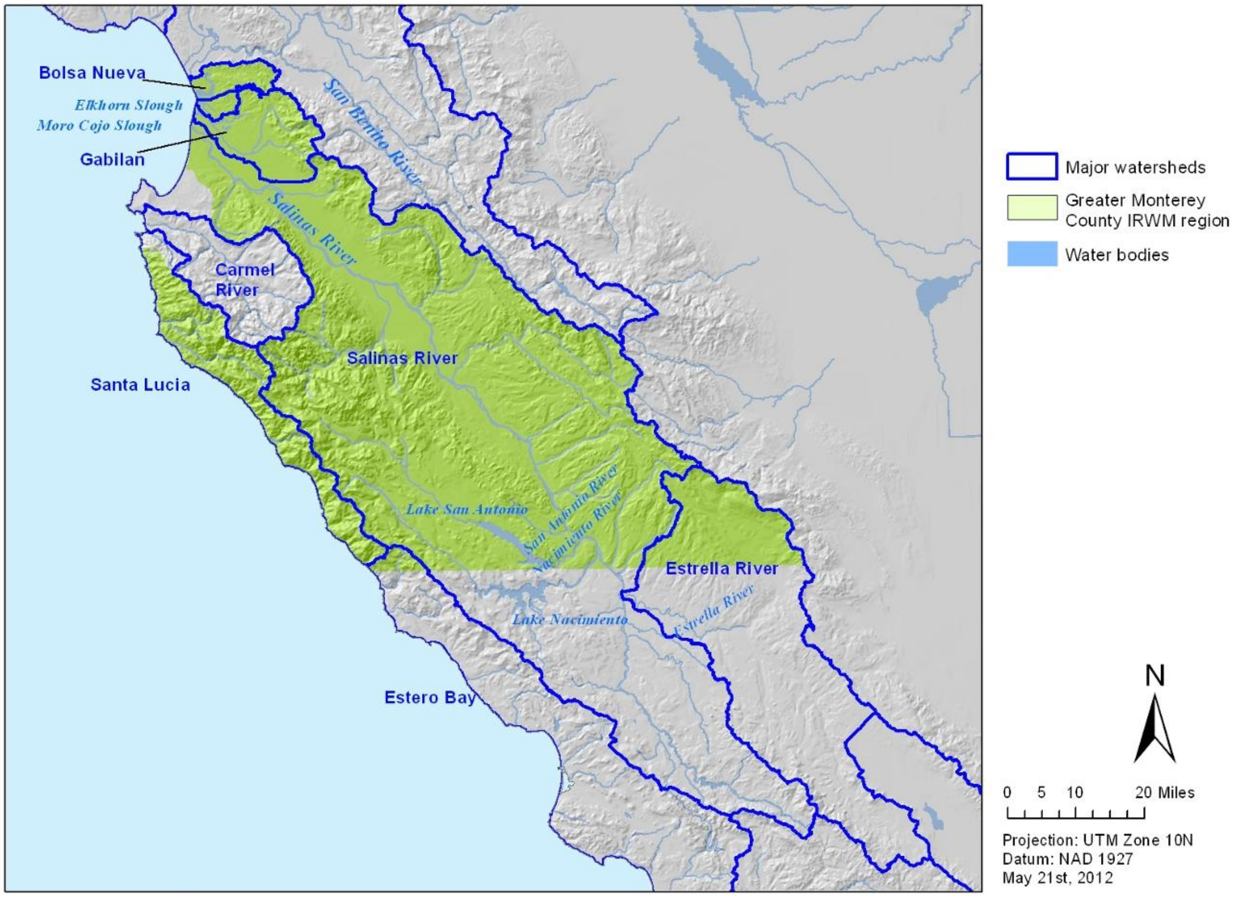
B.3 DESCRIPTION OF WATERSHEDS AND WATER SYSTEM

The following sections provide an overview of the watersheds, significant environmental resources, and water systems in the region, including surface waters, groundwater, reclaimed water, desalination, floodwater, and water supply infrastructure. These systems are integrally interconnected. The Greater Monterey County IRWM region receives no "imported" water, that is, no water from the State Water Project or from any other water source imported from outside of its boundaries (except for water from the Salinas River, which flows naturally from San Luis Obispo County). Therefore, maintaining the region's water systems is absolutely critical for ensuring the health, prosperity, and long-term sustainability of local communities in the region. Maintaining adequate water supply and good water quality, in turn, depend on the health and proper functioning of the watersheds and wilderness areas that sustain and protect the region's water resources.

B.3.1 Watersheds

The Greater Monterey County IRWM region includes six major watersheds (or portions thereof). The Salinas River watershed is by far the largest watershed in the region, encompassing an area of approximately 3,950 square miles within Monterey and San Luis Obispo Counties. The watershed includes the Salinas Valley, which extends from the Salinas River headwaters in the La Panza and Garcia Mountains in San Luis Obispo County to Monterey Bay, a length of approximately 170 miles. Other major watersheds in the Greater Monterey County region include the Santa Lucia watershed, comprised of the numerous coastal watersheds along the Big Sur coast (including the Big Sur River watershed and Little Sur River watershed, among many others), the Estrella River watershed which is located in the southern part of the county (most of this watershed is actually located in San Luis Obispo County), and the Bolsa Nueva and the Gabilan Creek watersheds at the northern end of the county. The region also includes a small portion of the Estero Bay watershed at the southern end of the county along the Big Sur coast. Figure B-6 illustrates major watershed boundaries within the Greater Monterey County IRWM region.

Figure B-6: Major Watersheds of the Greater Monterey County IRWM Region



In terms of hydrologic units, the Greater Monterey County region includes the following hydrologic unit areas (as outlined by the RWQCB in the Central Coast Basin Plan):

Table B-1: Hydrologic Units in the Greater Monterey County IRWM Region

Hydrologic Unit #	Hydrologic Unit/Area/Subarea
306.00	Bolsa Nueva
308.00	Santa Lucia
309.00	Salinas
309.10	Lower Salinas Valley
309.20	Chualar
309.30	Soledad
309.40	Upper Salinas Valley
309.60	Arroyo Seco
309.70	Gabilan Range
309.80	Paso Robles
309.82	Nacimiento Reservoir
309.83	San Antonio Reservoir

B.3.2 Biological Resources

Monterey County occurs within one of the richest biological regions in North America (Ricketts et al. 1999; Abell et al. 2000). Monterey County is especially rich in biological resources because of its highly varied terrain, large elevation range, extensive coastline, broad range of microclimates, and diverse substrate materials. This variability is reflected in the large array of plant communities and resident plant and animal species. For example, there are nearly 3,000 species of plants that occur in Monterey County according to Calflora, a database of California plants (to see the list, visit: http://www.calflora.org/). Of these, 287 plant species are listed on the California Department of Fish and Game's (CDFG) 2012 California Natural Diversity Database as "State and Federally Listed Endangered, Threatened, and Rare Plants of California," and 101 plant species are considered to be rare or sensitive by the California Native Plant Society. This section provides an overview of the region's significant ecological processes and environmental resources in terms of vegetation, wilderness, conservation, and open space areas, fisheries, species and habitats of special concern, and management issues.

Note: Much of this Biological Resources section has been either excerpted or summarized from Section 4.9 of the 2010 Monterey County General Plan Environmental Impact Report (EIR) (Monterey County Planning Department 2010b).

B.3.2.a Vegetation

Natural vegetation throughout the county is typical of that occurring in the coastal ranges and interior valleys of central California. The coastal Big Sur coastal range is dominated by redwood, oak woodland, coastal chaparral, and annual grassland. The Salinas Valley is dominated by agriculture and, in the southern county, by significant stands of oak woodlands. The Gabilan Range to the east is dominated by annual and native grassland, and by mixed oak forests. In the northern coastal section of the region are beach dunes near the former Fort Ord and marshlands around the Elkhorn Slough as well as rare maritime chaparral species.

The region includes many vegetation types or plant communities that are considered to be "sensitive natural communities" under the California Environmental Quality Act (CEQA). These include: freshwater marsh, riparian/wetland, native grassland/valley needlegrass grassland, coastal prairie/coastal terrace prairie, maritime chaparral, oak woodland, blue oak woodland, oak savannah, mixed conifer, redwood forest, dune and dune scrub, saltwater marsh and tidal mudflats. Other plant communities occurring in the region include coastal scrub, interior scrub and chaparral (baccharis chaparral, baccharis scrub, Gabilan scrub, and mixed chaparral), eucalyptus groves, and annual grassland. Table B-2 below provides approximate acreages for vegetation communities that occur in Monterey County.

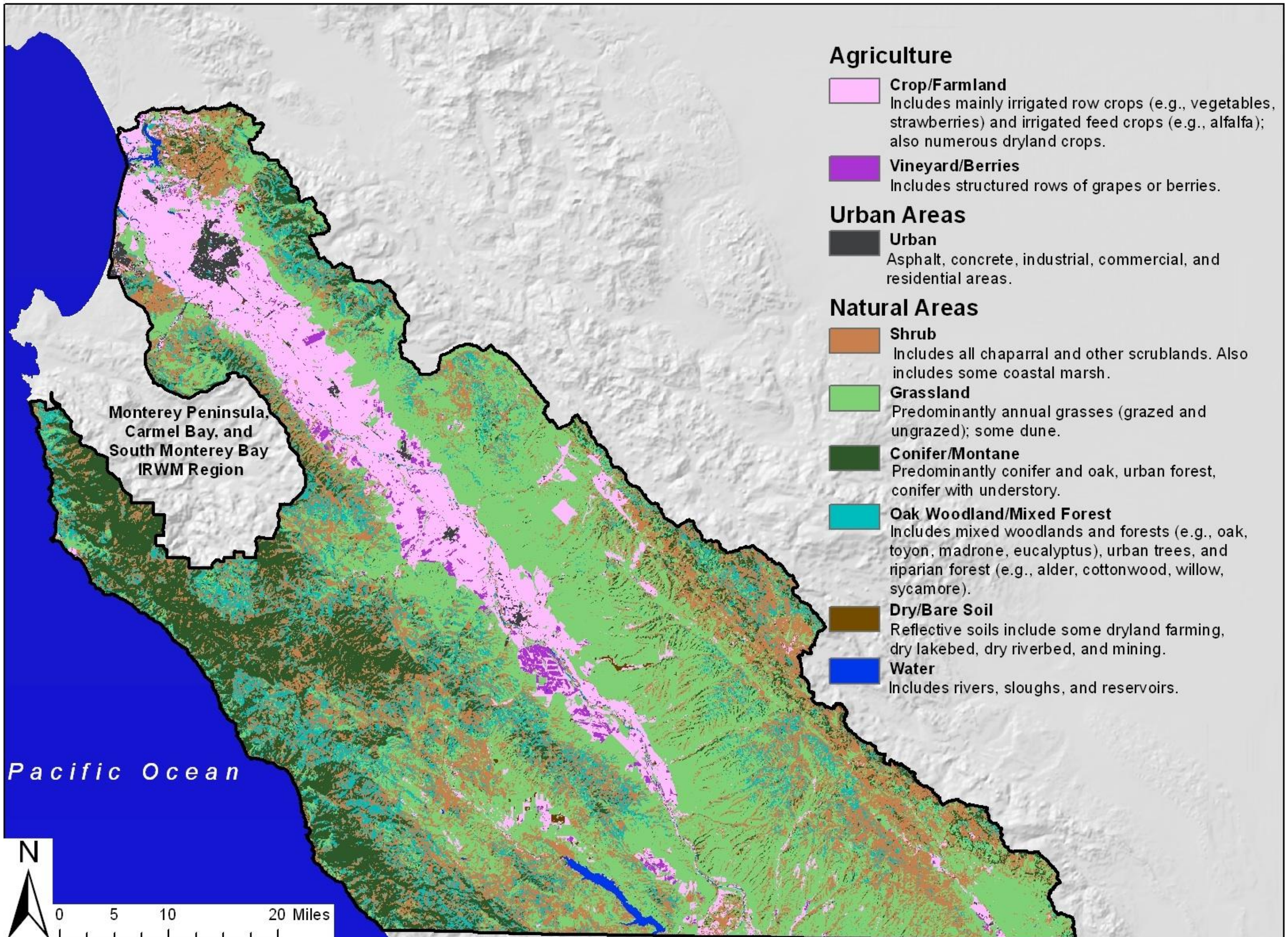
Table B-2: Monterey County Vegetation Communities, Estimated for 2006

Vegetation Community	**Acres**
Annual Grassland	711,714
Oak Woodland	416,786
Agriculture	262,199
Baccharis Scrub	204,258
Oak Savanna	201,194
Gabilan Scrub	115,040
Urban/Non-Veg	62,284
Sparse Vegetation/Bare Soil	32,789
Mixed Conifer	25,532
Riparian/Wetland	24,891
Redwood Forest	21,734
Maritime Chaparral	12,115
Coastal prairie	9,426
Blue Oak Woodland	5,606
Saltwater Marsh	5,304
Dune Scrub	2,812
Baccharis Chaparral	2,138
Monterey Pine Forest	2,010
Eucalyptus	1,158
Golf Course	580
Coastal Scrub	512
Valley Needlegrass Grassland	392
Dune	281
Freshwater Marsh	148
Coastal Terrace Prairie	97
Native Grassland	81
Total	**2,121,082**

Source: Monterey County Planning Department 2010b, Section 4.9.3. Includes cities and coastal areas. Note: The table includes areas beyond the boundaries of the Greater Monterey County IRWM region, for example in the Monterey Peninsula region, the Carmel River watershed, and the Pajaro River watershed.

Figure B-7 below illustrates the general vegetation and land use divisions within the Greater Monterey County region in terms of agricultural, urban, and natural areas.

Figure B-7: Land Uses in the Greater Monterey County IRWM Region



Newman, W., Watson, F., Angelo, M., Casagrande, J., & Feikert, B. (2003). Land use history and mapping in California's Central Coast region. Report to the Central Coast RWQCB. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2003-03, 86 pp.

B.3.2.b Wilderness, Conservation Areas, and Open Space

The Greater Monterey County region includes approximately 500,000 acres[5] of land dedicated to wilderness, conservation areas, and open space. Some of the most significant of these areas are described below.

Los Padres National Forest: The magnificent Los Padres National Forest stretches across nearly 220 miles from the Big Sur coast to the western edge of Los Angeles County, encompassing 1.75 million acres of land. Within the Los Padres National Forest and included in the Greater Monterey County region are two spectacular wilderness areas, the 31,500-acre Silver Peak Wilderness and the 240,000-acre Ventana Wilderness. Los Padres is owned and managed by the U.S. Forest Service, though there are a significant number of privately owned properties that exist inside the forest boundaries as in-holdings. Most of the Los Padres National Forest is composed of steep, rugged coastal mountains with watersheds that supply 19 reservoirs. Los Padres contains a wide range of ecosystems, from seacoast and marine habitats to redwood forests, mixed conifer forests, oak woodlands, grasslands, pinyon juniper stands, chaparral and semi-desert areas, which are home to more than 468 fish and wildlife species (including 23 threatened or endangered wildlife species, 20 regionally sensitive wildlife species, and 34 forest-level sensitive wildlife species). Los Padres provides habitat for and is involved with the reintroduction of California condors, bald eagles, peregrine falcons, tule elk, bighorn sheep and many endangered plants.[6]

Pinnacles National Monument: Owned and managed by the U.S. National Park Service, Pinnacles National Monument encompasses about 26,000 acres in the southern portion of the Gabilan Mountains. The Monument was established in 1908 to preserve the incongruent and beautiful rock formations for which Pinnacles is named. The park's striking beauty is attributable, in part, to the Monument's geologic formations, showcase chaparral habitat, finely intergraded ecosystems, and protected native plant and animal diversity. More than 80 percent of the park (15,985 acres) is designated as the Pinnacles Wilderness area. Prairie falcons breed in this area in some of the highest densities of anywhere in North America. Peregrine falcons have also recently returned to the Monument to breed (though in far fewer numbers). A California condor re-establishment program has been in place since 2003.[7]

Salinas River National Wildlife Refuge: The Salinas River National Wildlife Refuge is located approximately 11 miles north of Monterey and three miles south of Castroville, at the point where the Salinas River empties into Monterey Bay. The 367-acre refuge was established in 1974 because of its "particular value in carrying out the national migratory bird management program." The area encompasses several habitat types including sand dunes, pickleweed salt marsh, river lagoon, riverine, and a saline pond, and provides habitat for several threatened and endangered species, including the California brown pelican, Smith's blue butterfly, the western snowy plover, the Monterey sand gilia, and the Monterey spineflower.[8]

Fort Ord National Monument: In April 2012, President Obama declared the Fort Ord Public Lands to be a national monument under the 1906 Antiquities Act. Fort Ord was a former military base established in 1917 and closed in 1994. Approximately half of Fort Ord's 14,651 acres is under the stewardship of the U.S. Bureau of Land Management (BLM). The other half is barred from public use because it could still contain old unexploded ordnance from military years. The Army Corps of Engineers is cleaning up those

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[5] Estimated by the Big Sur Land Trust staff, personal communication between BSLT staff and IRWM Plan Coordinator, January 18, 2012.

[6] Excerpted from the USDA Forest Service website: http://www.fs.usda.gov/lpnf.

[7] Excerpted from the National Park Service website: http://www.nps.gov/pinn/index.htm.

[8] Excerpted from the US Fish and Wildlife website: http://www.fws.gov/sfbayrefuges/salinasriver/

lands and expects to have them ready for public use by 2019.[9] The goal of the community-based Fort Ord Reuse Plan (1997) is to: "Promote the best use of land through well planned and balanced development which ensures educational and economic opportunities as well as environmental protection." Habitat preservation and conservation are primary missions for the Fort Ord National Monument. BLM protects and manages 35 species of rare plants and animals along with their native coastal habitats. The National Monument also includes more than 86 miles of trails for the public to explore on foot, bike or horseback.[10]

State Parks, Beaches, and Wildlife Preserves: The California Department of Parks and Recreation operates six state parks in the Big Sur region: Garrapata State Park (2,879 acres), Andrew Molera State Park (4,766 acres), Pfeiffer Big Sur State Park (1,006 acres, centered around the Big Sur River and nicknamed a "mini Yosemite"), Julia Pfeiffer Burns State Park (3,762 acres, featuring an 80-foot waterfall and redwoods over 3,500 years old), Limekiln State Park (716 acres), and the Point Sur Historic Park. Other state parks of note in the Greater Monterey County region include Fort Ord Dunes State Park, a 979-acre state park on Monterey Bay, and Fremont Peak State Park, a state park located in the Gabilan Range. State beaches in the Greater Monterey County region include Marina State Beach, a 170-acre protected beach that features some of the highest sand dunes on the Central California coast; Salinas River State Beach, located at the south end of Moss Landing; and Moss Landing State Beach. Moss Landing Wildlife Area is a California State wildlife preserve administered by the CDFG and located on the shore of Elkhorn Slough, just north of Moss Landing. The Moss Landing Wildlife Area protects 728 acres, with access allowed only by foot; all plants and animals are protected.

Other Parks and Protected Areas: One of Central Coast California’s most significant undeveloped open spaces is Palo Corona Regional Park. The Big Sur Land Trust, The Nature Conservancy, State of California, and Monterey Peninsula Regional Park District partnered to acquire the 10,000-acre Palo Corona Ranch in 2004. The 10,000-acre ranch was then divided between the CDFG and the Park District to be protected as public conservation and parkland in perpetuity. The CDFG added the southern 5,500 acres of the former ranch to its existing 640-acre Joshua Creek Ecological Preserve, and the Park District created the new Palo Corona Regional Park with the northern 4,350 acres of the former ranch. The park establishes a critical environmental link in a protected 70-mile long wild land corridor that begins at the Carmel River and extends southward to the Hearst Ranch in San Luis Obispo County. The Palo Corona Regional Park includes the headwaters of 13 watersheds and protects significant habitat areas, wildlife corridors, wildlife, and endangered species.

Toro County Park, owned by Monterey County Parks, is a popular recreational park located six miles from downtown Salinas. Along with many recreational facilities and over 20 miles of hiking trails, the park’s 4,756 acres is also home to many types of wildlife, including the occasional mountain lions and golden eagles.

Another significant protected area in the Greater Monterey County region is Landels-Hill Big Creek Reserve located along the Big Sur coast. This 3,848-acre reserve is owned and managed by the University of California Natural Reserve System and the University of California at Santa Cruz. In addition to protecting the outstanding natural resources of the area, the purpose of the reserve is to support university research and education. Joshua Creek Canyon Ecological Preserve, mentioned previously, is also in Big Sur, owned by CDFG and comprising approximately 6,140 acres.

[9] Excerpted from online article, “Fort Ord declared a national monument by Obama,” written by Ellen Huet in the San Francisco Chronicle, dated April 21, 2012: http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2012/04/20/BAVN1O6SL3.DTL

[10] From the BLM website: http://www.blm.gov/pgdata/content/ca/en/fo/hollister/fort_ord/index.html

Estuarine, Coastal, and Ocean Protected Areas

Monterey Bay National Marine Sanctuary: The Greater Monterey County region is situated adjacent to the federally protected Monterey Bay National Marine Sanctuary (MBNMS), encompassing four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).[11] The MBNMS was designated in 1992 as a federally protected marine area offshore of California's Central Coast. Supporting one of the world's most diverse marine ecosystems, it is home to numerous mammals, seabirds, fishes, invertebrates and plants in a remarkably productive coastal environment. The Sanctuary encompasses 276 miles of shoreline and 6,094 square statute miles of ocean, covering everything below the water's surface from Marin County to Cambria, from the high tide mark to as far as 53 miles offshore. The MBNMS was established for the purpose of resource protection, research, education, and public use of this national treasure, and is part of a system of 13 National Marine Sanctuaries administered by the National Oceanic and Atmospheric Administration (NOAA).

Elkhorn Slough National Estuarine Research Reserve: The Elkhorn Slough National Estuarine Research Reserve, part of the MBNMS, provides some of the most important freshwater marsh and brackish marsh habitat for wildlife in California. The slough is located in the northern coastal area of the Greater Monterey County IRWM region, and is one of the few coastal wetlands remaining in California. The main channel of Elkhorn Slough, which winds inland nearly seven miles, is flanked by a broad salt marsh second in size in California only to San Francisco Bay. The reserve lands also include oak woodlands, grasslands and freshwater ponds that provide essential coastal habitats that support a great diversity of native organisms and migratory animals. More than 400 species of invertebrates, 80 species of fish, and 200 species of birds have been identified in Elkhorn Slough. The channels and tidal creeks of the slough are nurseries for many species of fish. At least six threatened or endangered species utilize the slough or its surrounding uplands, including peregrine falcons, Santa Cruz long-toed salamanders, California red-legged frogs, brown pelicans, least terns and sea otters. Additionally, the slough is on the Pacific Flyway, providing an important feeding and resting ground for many types of migrating waterfowl and shorebirds.

Elkhorn Slough is protected by a combination of private, federal, and state landowners including the Elkhorn Slough National Estuarine Research Reserve, the Moss Landing Wildlife Area, and the Nature Conservancy. In 1989, the Elkhorn Slough Wetland Management Plan was prepared for the California State Coastal Conservancy and the Monterey County Planning Department to address the preservation and protection of wetlands and other sensitive resources.

Big Creek: Big Creek State Marine Reserve (SMR) and Big Creek State Marine Conservation Area (SMCA) are two adjoining marine protected areas that lie offshore of Big Sur on California's central coast. The combined area of these marine protected areas is 22.5 square miles. The SMR protects all marine life within its boundaries. Fishing and take of all living marine resources is prohibited. Within the SMCA fishing and take of all living marine resources is prohibited except the commercial and recreational take of salmon, albacore, and the commercial take of spot prawn.

Moro Cojo Estuary State Marine Reserve: Moro Cojo SMR is a marine protected area established to protect the wildlife and habitats in Moro Cojo Slough. Moro Cojo Slough is located inland from Monterey Bay, directly south of the Elkhorn Slough. The area covers 0.5 square miles. The SMR protects all marine life within its boundaries.

[11] Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

Figure B-8: Wilderness, Conservation Areas, and Open Space in the Greater Monterey County Region

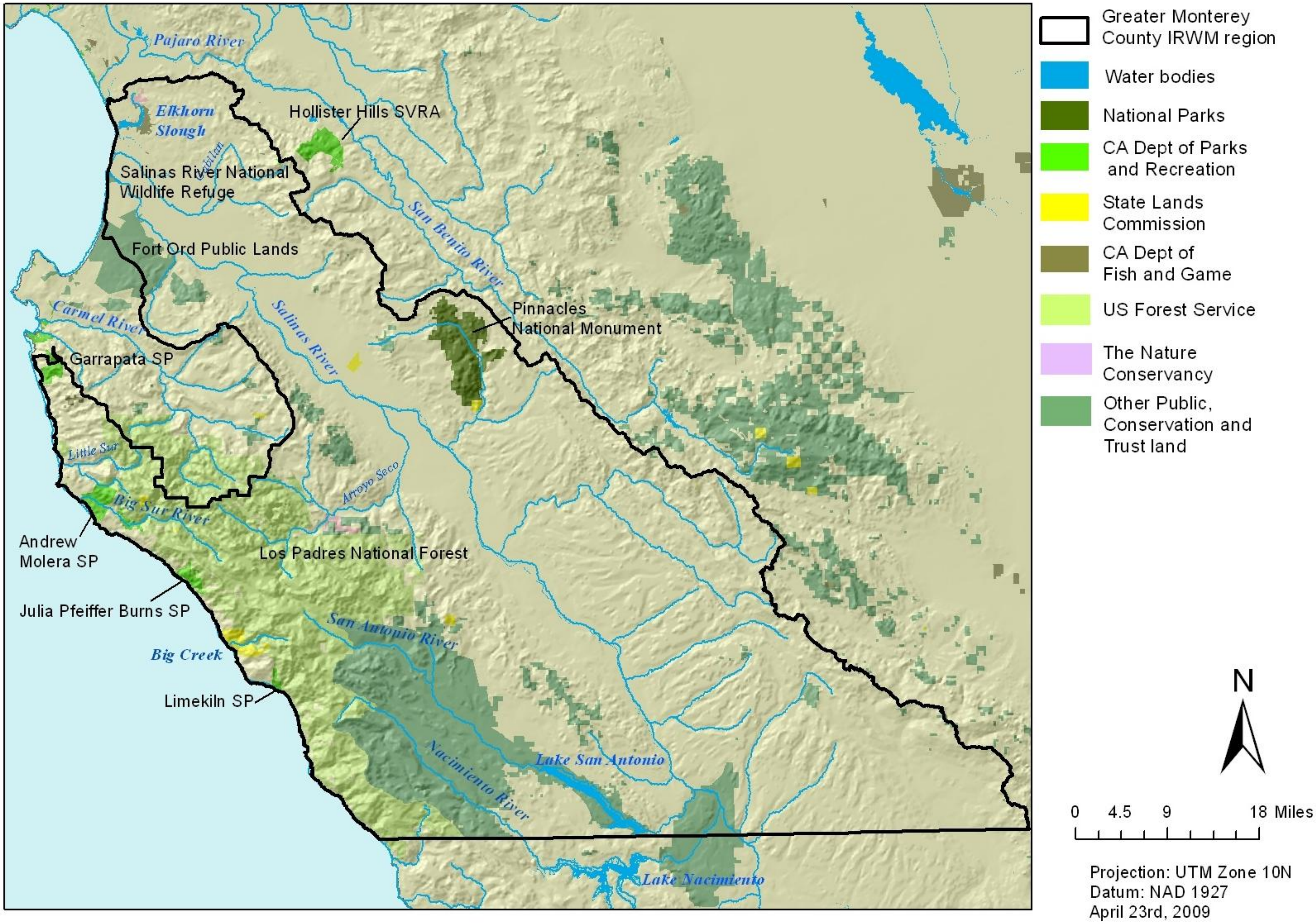
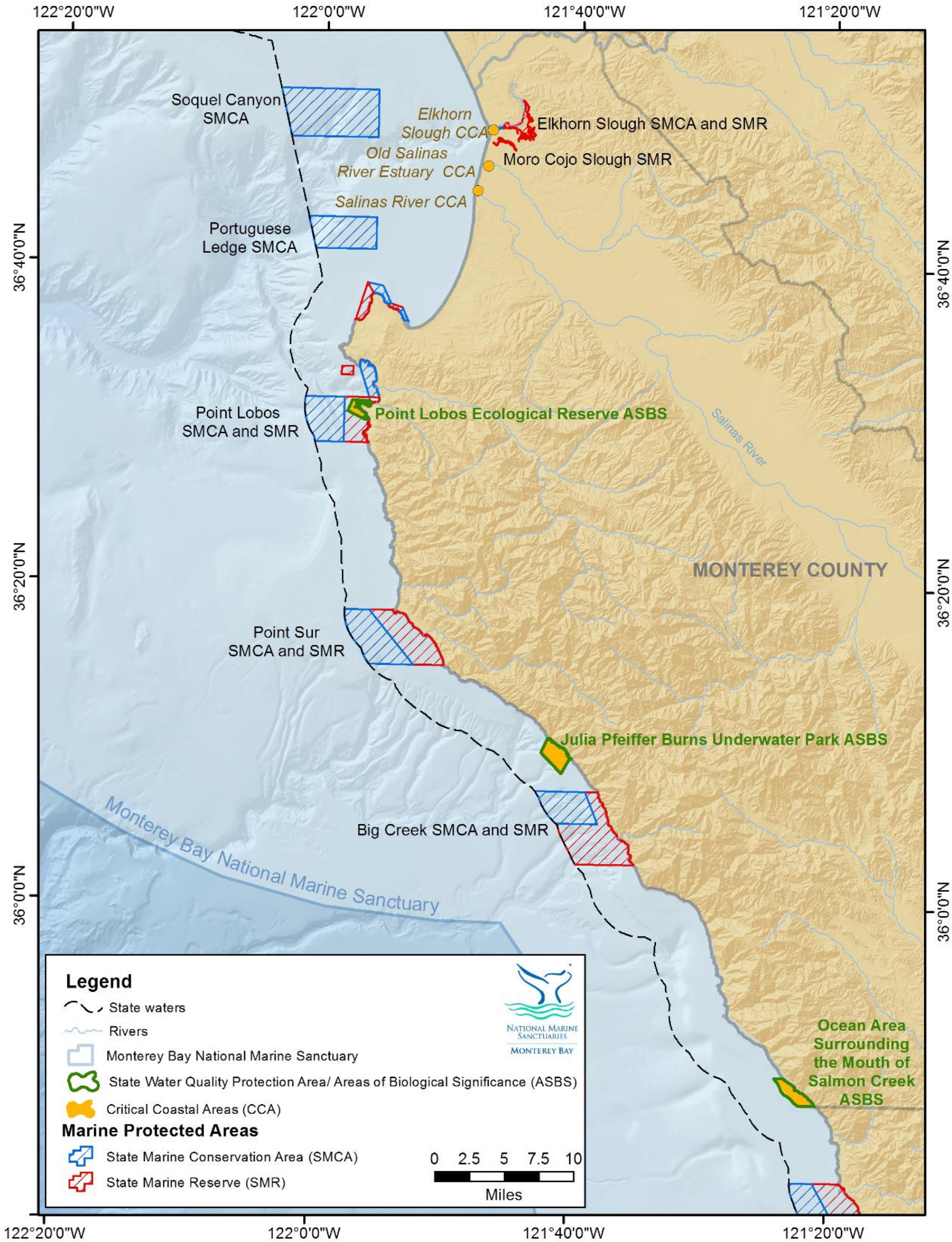


Figure B-9: Estuarine, Coastal, and Ocean Protected Areas within the Greater Monterey County Region



B.3.2.c Fisheries

The region's creeks and streams provide habitat for several federally protected species, including most notably South-Central California Coast steelhead (*Oncorhynchus mykiss*), federally listed as threatened in 1997 (and reconfirmed in 2006). The South-Central California Coast steelhead populations have declined from annual runs totaling 27,000 spawning adults to less than 500. The South-Central California Coast steelhead Distinct Population Segment (DPS) extends from the Pajaro River south to (but excluding) the Santa Maria River at the southern border of San Luis Obispo County, and includes those portions of coastal watersheds that are at least seasonally accessible to steelhead entering from the ocean. The major inland steelhead watersheds in the South-Central California Coast Steelhead Recovery Planning Area include the Pajaro, Salinas, and Carmel Rivers (NMFS 2007).

Within the Greater Monterey County IRWM region, critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries. According to a South-Central California Coast Steelhead Threats Assessment conducted in 2008, "Dams and water diversions (including groundwater extractions) on the major rivers of the Interior Coast Range BPG [Biogeographic Population Group] (Salinas and Pajaro Rivers) have had the most severe adverse impacts on the steelhead populations in this BPG, cutting off access to upstream spawning and rearing habitats and reducing both the magnitude and duration of flows, as well as altering the timing, necessary for immigration of adults and emigration of juveniles. Agricultural activities (including agricultural effluents) have also significantly impacted steelhead habitats through encroachment into the riparian corridor and degradation of water quality. … Estuarine habitat loss is also a significant threat source to steelhead populations" (Hunt & Associates 2008, p. 23). Many growers and ranchers in the region have been working to implement best management practices to improve riparian habitat through such initiatives as the Natural Resources Conservation Service's (NRCS) Environmental Quality Incentives Program (EQIP).

Along the Big Sur coast in Monterey County, major steelhead watersheds include Big Sur River, Little Sur River, and Big Creek. In Garrapata Creek along the Big Sur coast, steelhead populations were assessed as part of the watershed assessment and restoration planning effort in 2006, and specific recommendations were made and were implemented to reduce upslope erosion along the creek. Efforts to control invasive species are planned in the lower watershed area, and plans exist to remove in-stream barriers. In addition, steelhead enhancement recommendations have been developed for the Big Sur River, Little Sur River and Big Creek by state and federal resource agencies.

B.3.2.d Species and Habitats of Special Concern

There are 100 CEQA-defined special-status plant species and 47 CEQA-defined special-status fish and wildlife species that are known to occur in Monterey County. Listed CEQA-defined special-status species are plants and animals that are legally protected under the California Endangered Species Act (CESA) and federal Endangered Species Act (FESA). Non-listed CEQA-defined special-status species are plants and animals that are not listed under CESA or FESA but which meet the CEQA definition of a rare, threatened, or endangered species (State CEQA Guidelines Section 15380). Appendix I lists the special status plant and animal species that inhabit Monterey County, along with their protection status, California distribution, and habitat needs.

Among the 100 special-status plant species, the following are considered endangered or threatened (under CESA and/or FESA): beach layia, coastal dunes milk–vetch, Contra Costa goldfields, Hickman's cinquefoil, Menzies's wallflower, Monterey clover, robust spineflower, sand gilia, Santa Cruz tarplant, Santa Lucia mint, Seaside bird's–beak, Tidestrom's lupine, Yadon's rein orchid, Yadon's wallflower, Gowen cypress, Monterey spineflower, and purple amole.

The special-status fish and wildlife species known to occur in Monterey County include seven species of invertebrates (including the Smith's blue butterfly, bay checkerspot butterfly, and vernal pool fairy shrimp), 13 species of reptiles/amphibians (including the California red-legged frog, California tiger salamander, Arroyo toad, Santa Cruz long-toed salamander, and southwestern pond turtle), two species of fish (including the south-central California coast steelhead and tidewater goby), 20 species of birds (including the bald eagle, golden eagle, California brown pelican, California clapper rail, least Bell's vireo, and western snowy plover), and five species of mammals (including most notably the San Joaquin kit fox).

More than 70,000 acres in the county are designated as critical habitat by the U.S. Fish and Wildlife Service (USFWS). Critical habitat is defined by FESA as specific areas in which physical or biological features essential to the conservation of a protected species are present. The USFWS has designated critical habitat for the western snowy plover, California red-legged frog, California tiger salamander, Monterey spineflower, Santa Cruz tarplant, and purple amole in Monterey County (Monterey County Planning Department 2010b, Section 4.9). In addition, as noted above, NOAA Fisheries has designated several rivers and streams as critical habitat in Monterey County, including those along the Big Sur coast and several waterways within the Salinas River basin, for the South-Central California Coast DPS of steelhead (Federal Register [FR] 70: 52488).

B.3.2.e Watershed Management Issues

Management issues in the Greater Monterey County region watersheds are typical of those in watersheds throughout coastal California. Some of the most significant watershed management issues include the decline of aquatic species, and in particular, steelhead, erosion, invasive species, and fire management. While these four issues stand out in particular, numerous other water-related and water management issues and conflicts exist in the region, causing varying degrees of management challenges to landowners and resource managers. A list of such issues was compiled in October 2009 based on interviews with dozens of land use managers, water managers, and research scientists in the region. The list of regional issues and conflicts is included at the end of this chapter in Section B.7. Note that one issue that does not appear on the list but that some say may underlie many of the other issues is a general lack of scientific knowledge regarding the complexity and natural functioning of ecological systems.[12] Poor management decisions can often be made due to a simple lack of understanding.

The management issues related to steelhead, erosion, invasive species, and fire management are described briefly below.

Steelhead: Critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries. The National Marine Fisheries Service has identified seven principal threats that have contributed to the destruction, modification, or curtailment of the habitat or range of the South-Central California Coast steelhead. These include: 1) alteration of natural stream flow patterns; 2) physical impediments to fish passage; 3) alteration of floodplains and channels, including the degradation or elimination of riparian areas; 4) sedimentation; 5) urban and rural waste discharges; 6) spread and propagation of exotic species (such as bass and bullfrogs that prey on juvenile steelhead, and non-native plants such as *Arundo donax* and Tamarix); and 7) loss of estuarine habitat.

[12] Personal communication with Nikki Nedeff, Ecological Consultant to IRWM Plan Coordinator (June 10, 2011).

In the Salinas River system, two major factors contributing to the decline of steelhead are reduced in-stream flows limiting migration into the upper tributaries, and the reduction and degradation of riparian habitat due to agriculture, building construction, and other land use practices. As noted above, growers and ranchers in the region have been working to implement best management practices to improve riparian habitat, but conditions continue to deteriorate. Along the Big Sur Coast, steelhead enhancement recommendations have been developed for the Big Sur River, Little Sur River, and Big Creek by State and Federal resource agencies. Steelhead habitat recommendations have also been made for Garrapata Creek as part of a 2006 watershed assessment, and implementation has begun.

Erosion: Erosion is a widespread problem in Monterey County, due in part to the erosive nature of local soils as well as from land use practices. These land use practices include farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels that increase water velocities and alter the natural sediment balance, and areas that have been denuded of vegetation by fire, overgrazing, or clearing. Erosion from roads, agriculture, and unstable stream banks may carry pollutants and can be detrimental to aquatic habitat and organisms.

The Resource Conservation District (RCD) of Monterey County has been addressing erosion and sediment issues related to agricultural practices and farm/ranch roads in Monterey County for decades.[13] The RCD has provided assistance to Hispanic and other hillside (primarily strawberry) farmers for winter erosion control in the Elkhorn Slough, Moro Cojo and Gabilan watersheds. Projects include furrow alignment, furrow and road seeding, irrigation efficiency evaluations (i.e., runoff reduction for specific programs), and engineered practices for particularly problematic sites, including steep slopes with active gullies and erosion. Engineered practices include sediment traps, stormwater detention structures, underground outlets (capturing water at the top and midsections of a field and conveying it underground via pipe to a safe outlet at the bottom of the hill), and other pond-type structures. The RCD has also tested multiple “vegetated treatment systems” on land draining into the Salinas River, Elkhorn Slough, the Salinas Reclamation Ditch, and Blanco Drain.

In addition, the RCD provides education to farmers and private landowners on effective rural road management through individual site visits, workshops, and materials development. With assistance from the USDA NRCS, the Santa Cruz RCD, and the California Coastal Conservancy, the RCD is currently developing and implementing a Rural Roads Erosion Control Assistance Program to help private road associations and landowners identify and treat road erosion and drainage problems for long-term, low maintenance management that reduces sediment movement from rural roads to local waterways. Such projects benefit community access and safety as well as local wildlife dependent on healthy streams and rivers. The RCD recently developed a Private Roads Maintenance Field Guide for Monterey County that includes technical information on design and implementation of road drainage and maintenance practices.[14]

In addition, the MBNMS produced an *Agriculture and Rural Lands Action Plan* in 1999 that includes strategies to improve both public and private planning and maintenance practices for rural roadways in order to reduce erosion. The Sanctuary’s Agriculture Water Quality Coordinator is an active participant in pursuing implementation of those strategies with the RCDs and other partners described above.

Invasive Species: An invasive species is a non-native plant or animal species that, when introduced to an ecosystem, causes or is likely to cause economic or environmental harm, or harm to human health. Invasive plant species are usually able to out-compete local native plant species for water and space

[13] Source for this paragraph: RCD Spring 2011 newsletter, *Conservation Connections*: http://www.rcdmonterey.org/pdf/RCDMCnews-spring2011.pdf
[14] See RCD website: http://www.rcdmonterey.org.

because they are more prolific, have more vigorous growth, and lack predators that would otherwise help to keep them in check. They degrade habitat for other wildlife, domestic animals, recreation, and other land use activities.[15] In addition, weedy species can increase wildfire hazard and frequency, which is considered particularly problematic in Monterey County where wildfires pose a major threat. Non-native animal species tend to out-compete native species due to lack of natural predators, competition for habitat, and in some instances, preying on native species. Invasive species affect terrestrial, freshwater, estuarine, and marine systems throughout the region and pose a major challenge to private landowners, farmers, ranchers, and resource managers.

The invasive plant and animal species inhabiting the Greater Monterey County region are too numerous to list,[16] but "top offenders" for non-native plants in Monterey County include: *Arundo donax*, yellow star thistle, cape ivy, French broom, pampas/jubata grass, and wakame (a marine invasive plant, which is under eradication in Monterey Bay). The noxious weed *Arundo donax* deserves special mention: the *Arundo* infestation in the Salinas River represents the second-largest invasion in California of this nonnative invasive species. *Arundo* is an aggressive perennial grass that has overtaken approximately 2,500 acres of the Salinas River, forming enormous monocultures with virtually no food or habitat value for native wildlife. Non-native "top offender" animal species in Monterey County include red squirrels, red fox, and bullfrogs. Appendix J includes lists of non-native invasive plant and animal species found in the Monterey County area, compiled from various sources.

Fire Management: The Big Sur coast area is susceptible to major wildfires, and while wildfires are a necessary part of the natural cycle they can cause serious degradation to water and other natural resources. Major wildfires can cause excessive erosion and impaired water quality in creeks, destroy or damage small community water and wastewater systems, and damage public and private roads. Runoff from rain can wash debris from wildfires into coastal creeks and the ocean, with potentially detrimental effects on nearshore marine communities.

A series of record-breaking wildfires burned through Big Sur and the Santa Lucia Range during the summer of 2008. The Indians Fire began on June 8th and was ignited by an unpermitted campfire, while the Basin Complex Fire was ignited by lightning on June 21st, and merged with the Indians Fire by June 25th. About 240,000 acres of federal, state, and private lands—83 percent of which was a part of the Monterey District of the Los Padres National Forest—burned in the fire, making it the seventh largest fire in California history. The fire extended south to Fort Hunter Liggett and north to Carmel Valley, creating a footprint 40 miles north-south and 15 miles east-west. Watershed evaluations were conducted following the fire, and research and monitoring projects were set up to track terrestrial inputs from the fires and determine if those inputs alter water chemistry, quality, and clarity of nearshore waters. The projects also measured community-level responses in the rocky intertidal and adjacent kelp forests.

As development in the wildland/urban interface continues to grow, wildfires also pose an increasing threat to human lives and infrastructure. Fire management at the wildland/urban interface brings to fore competing interests between those whose mission it is to protect structures and those whose mission it is to protect forestlands. While foresters and environmentalists tend to consider natural fires (or when appropriate, prescribed burns) to be healthy for the forest and helpful or even necessary for reducing the intensity of wildfires, those whose job it is to fight structure fires, and certainly most homeowners, tend to

[15] See Monterey County Agricultural Commissioner's Office website: http://ag.co.monterey.ca.us/pages/invasive-weeds.

[16] The California Invasive Plant Inventory Database, compiled by the California Invasive Plant Council (Cal-IPC), includes 166 invasive plant species in the "Central West" region (as of September 2011), which roughly comprises the Monterey County area. See California Invasive Plant Council website: http://www.cal-ipc.org/ip/inventory/weedlist.php?region=CW

consider all fires destructive and dangerous. This dichotomy poses a growing challenge for foresters, fire fighters, policy makers, land use planners, and others involved in fire management issues in the region.

A relatively recent effort responding to this challenge, led by the US Forest Service and facilitated by The Nature Conservancy, is FireScape Monterey.[17] FireScape Monterey is a collaborative approach to wildfire management that aims to bring all stakeholders to the table (including those that are traditionally opposed), to "leave swords at the door" and develop wildfire management practices that make sense from a "landscape" fire management point of view rather than a "jurisdictional" point of view. The effort covers a very broad geographic area, including the Los Padres National Forest and Ventana Wilderness, north to Marina, east to Salinas, down the Salinas River to Lake Nacimiento, with the intent of including a sphere of influence that will eventually cover all of Monterey County. FireScape Monterey is in the process of developing goals and strategies and an implementation plan.

B.3.2.f A Note About Climate Change and Biological Resources

It is important to note that many of the important biological resources in the region—particularly species and communities that are indigenous or unique to the region, or that are otherwise considered "special status"—may become increasingly vulnerable in future years due to the impacts of climate change. Climate change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur; this could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species.

Climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity. The Inter-governmental Panel on Climate Change (IPCC) stated that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts within this century if global mean temperatures exceed 2°C to 3°C (3.6°F to 5.4°F) relative to pre-industrial levels" (IPCC 2007a). The following provides just a few examples of anticipated climate change impacts on biological resources in the local region:

- Sea level rise will impact current estuary brackish water interface towards more marine systems. Coastal wetland systems are likely to be inundated with increasing frequency, leading to the dieback of tidal marshes and the salinization of fresh and brackish marshes.
- Changes in precipitation, increased drought, higher flood peaks, and lower spring/summer runoff will likely stress and may threaten many aquatic and plant communities.
- Migration patterns and species distribution will change.
- Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment.
- Wildfires may become more severe and more frequent, making it difficult for native plant species to repeatedly re-germinate.
- Changes in hydrograph (driven by rainfall pattern changes) will cause increased erosion and habitat loss in creeks and rivers.
- Some locally unique species and communities such as maritime chaparral, coastal prairie, coastal redwoods and giant kelp that are susceptible to changes in certain locally favorable climate variables (fog duration, coastal upwelling) will become more vulnerable as these conditions change.

[17] For more information, visit the FireScape Monterey website: http://firescape.ning.com/.

The RWMG, with assistance from a Climate Task Force comprised of regional scientists, water managers, and coastal policy professionals, has conducted an analysis to assess priority climate change impacts to the region. Priority impacts are defined as those that are more likely to occur and that will lead to significant impacts if they do occur. Table R-8 in Section R depicts the relative risk of each climate change impact scenario, along with a relative level of urgency to act (priority level). Table R-8 shows the results of two separate analyses: one that considers the cumulative consequences from the combined impacts to five different social, economic, and environmental factors (including specifically: public safety, local economy and growth, community and lifestyle, environment and sustainability, and public administration); and a second analysis that considers the consequences for environmental resources and sustainability only. Table B-3 below shows the results of the second analysis. The table highlights the climate change impacts that are considered highest priority (i.e., "extreme" and "high" priority) for the region in terms of consequences for environmental resources, and that therefore require more urgent action.

Table B-3: Priority Climate Change Impacts Based on Environmental Consequences

Priority Level	Climate Change Consequences
Water Supply	
Extreme	Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration
	Local rainfall changes are estimated to be reduced by 3-10 inches
	Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion
	Droughts will be more frequent and severe
High	Rangelands are expected to be drier
	Domestic landscaping water needs will be higher
Water Quality	
High	Lower seasonal surface flows can lead to higher pollutant concentrations
	Changes in storm intensity will increase sediment loading in many systems
Flooding	
Extreme	Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise
High	Regional levees will provide less protection during higher storm flow events
	Natural creeks throughout the region and managed conveyance within the Salinas Valley will see higher flow rates leading to increased erosion and flooding
Ecosystem Vulnerabilities	
Extreme	Sea level rise will impact current estuary brackish water interface towards more marine systems
	Coastal wetland systems are especially vulnerable to the combined influences of climate change
High	Migration patterns and species distribution will change
	Some locally unique species such as coastal redwoods and giant kelp are susceptible to changes in certain locally favorable climate variables (fog duration, coastal upwelling)

Please see Section R, Climate Change, for a full discussion of climate change and its potential consequences for water supplies and natural resources in the Greater Monterey County region.

B.3.3 Water System

This section describes the water system in the Greater Monterey County IRWM planning region as it pertains to surface freshwater systems, groundwater basins, reclaimed water, desalted water, floodwater, estuarine, coastal, and ocean waters, and wastewater. These separate water systems work collectively as part of the water system being managed in the Greater Monterey County region, all within the context of the region's watersheds and natural resources described above. Note that the Greater Monterey County IRWM region receives no "imported" water (except for Salinas River water that originates in San Luis Obispo County), and therefore maintaining the region's water system is absolutely critical for ensuring the health, prosperity, and long-term sustainability of local communities in the region. The region's water system is managed for water supply, water quality, flood protection, and for the healthy functioning of the region's natural resources.

The various elements of the water system in the Greater Monterey County region are interconnected. Surface waters within the region's watersheds—including reservoirs, rivers, creeks, rainfall, irrigation water applied to fields, agricultural drainage ditches, urban runoff, and unlined wastewater ponds—flow either downstream into coastal wetlands and coastal waters or down into the ground, infiltrating groundwater basins. The quality of that water affects both drinking water supplies and the health of the region's aquatic resources. As water is used, wastewater is created. Much of this wastewater is reclaimed for agricultural and landscape use. The use of recycled water not only increases the region's water supply, but helps protect the groundwater from seawater intrusion by providing an alternative source of irrigation and landscaping water. Desalted water, both from coastal waters and from wastewater, is currently being pursued to supplement the region's water supply. Floodwater is managed to protect lives and property, and the management of floodwater and of floodplains directly affects the health of the surrounding natural resource systems. Each element of the water system is part of this collective, integrally linked system. The individual elements of that water system are described in turn below.

B.3.3.a Surface Waters

The significant surface waters of the Greater Monterey County IRWM region include the Salinas River in the Salinas Valley and its tributaries; the San Antonio and Nacimiento Reservoirs, which control water flows to the Salinas River and, consequently, impact recharge of the Salinas Valley Groundwater Basin; the numerous rivers originating in the Santa Lucia Mountains along the Big Sur coast, which provide the main source of water for water users in that portion of the region; the Elkhorn Slough and Moro Cojo Slough; the Monterey Bay, and the coastal waters of the Monterey Bay National Marine Sanctuary.

The MBNMS is a federally protected marine area offshore of California's central coast. Stretching from Marin to Cambria, from the high tide mark to as far as 53 miles offshore, the MBNMS encompasses a shoreline length of 276 miles and 6,094 square miles of ocean. The MBNMS was established for the purpose of resource protection, research, education, and public use, and is part of a system of 13 National Marine Sanctuaries administered by NOAA. Its natural resources include our nation's largest kelp forest, one of North America's largest underwater canyons and the closest-to-shore deep ocean environment in the continental United States. The MBNMS is home to one of the most diverse marine ecosystems in the world, including 33 species of marine mammals, 94 species of seabirds, 345 species of fishes, and numerous invertebrates and plants. The Greater Monterey County region includes approximately 65 miles of coastline adjacent to the MBNMS, and the main channel of the Elkhorn Slough.

Located in the northern coastal area of the Greater Monterey County region, Elkhorn Slough, Moro Cojo Slough and the surrounding areas that drain to Moss Landing Harbor provide some of the most important estuarine habitat for wildlife in California, including extensive areas of salt marsh, brackish marsh, freshwater marsh, intertidal mudflats and open water. The main channel of Elkhorn Slough, which winds inland nearly seven miles, is flanked by a broad salt marsh that is the largest in California south of San Francisco Bay. The diversity of both birds and marine invertebrates in the Elkhorn Slough is among the highest in the United States, and the slough is an important breeding area for sharks, rays and commercially harvested flatfish.

The Salinas River is the third longest river in the state of California and the largest water system in

Monterey County, extending about 155 miles from its headwaters at the Santa Margarita Reservoir in San Luis Obispo County to its mouth at the Monterey Bay. The Salinas River drains approximately 4,043 square miles of land. Several tributaries enter the river along the length, including Pancho Rico Creek, Santa Rita Creek, Estrella Creek, Chalone Creek, San Lorenzo Creek, El Toro Creek, Prunedale Creek, Arroyo Seco River, Nacimiento River and San Antonio River.

The Arroyo Seco River is the largest undammed tributary to the Salinas River and is an important source of groundwater recharge to the Salinas Valley Groundwater Basin. The river is 40 miles long and drains 275 square miles of watershed, most of which lies in the rugged coastal range areas southwest of Greenfield and Soledad. The dramatic topographical relief of its drainage area and the fact that there are no dams on the Arroyo Seco make the river prone to flash flooding. The river is therefore significant for Salinas River flood management. Watersheds bordering the Arroyo Seco drainage are the Carmel River and Big Sur River to the northwest, multiple small creeks flowing into the Pacific on the west, the San Antonio River to the south, and other smaller tributaries of the Salinas on the east. As it is the only perennial Salinas River tributary without dams, the Arroyo Seco also sustains a small population of steelhead trout. In recognition of this fishery, as well as its obvious scenic and recreational values, the Arroyo Seco River and its tributary, Tassajara Creek, have been determined eligible for National Wild & Scenic River status by the U.S. Forest Service.

The San Antonio and Nacimiento Rivers are by far the largest tributaries to the Salinas River, with watersheds of about 330 and 328 square miles, respectively. Dams owned and operated by the MCWRA control both of these rivers. The San Antonio River has its headwaters in the Santa Lucia Mountains and flows in a southeasterly and easterly direction through the Los Padres National Forest and Fort Hunter Liggett Military Base to its confluence with the Salinas River, for a total length of 58 miles. The Nacimiento River, located about five miles southwest of the San Antonio River, originates in the Santa Lucia Mountains and flows southeasterly through the Los Padres National Forest, Fort Hunter Liggett, and Camp Roberts to its confluence with the Salinas River, for a total length of 54 miles. Nacimiento and San Antonio Rivers contribute approximately 200,000 acre-feet/year (AFY) and 70,000 AFY, respectively, to the Salinas River.

The Nacimiento and San Antonio Dams—built in 1957 and 1967, respectively—were constructed to control floodwaters and to release water into the Salinas River for percolation to underground aquifers throughout the summer. At maximum pool, the Nacimiento Reservoir’s storage capacity is 377,900 AF with a surface elevation of 800 feet and a surface area of 5,400 acres. The Nacimiento Reservoir yields on average about 62 percent of the total water in the Salinas River system. At full pool, the San Antonio Reservoir has a volume of 335,000 AF, surface elevation of 780 feet, and a maximum depth of 180 feet. The San Antonio Reservoir yields on average about 13 percent of the total water in the Salinas River system.

The Nacimiento and San Antonio Reservoirs are considered the most prominent elements of the region’s water infrastructure. The watersheds of both the Nacimiento and San Antonio Reservoirs lie astride the boundaries of Monterey and San Luis Obispo Counties; and although the Nacimiento Reservoir is owned and operated by the MCWRA, it is actually located entirely within San Luis Obispo County, outside of the Greater Monterey County IRWM region. San Luis Obispo County has existing entitlements to 17,500 AFY of water from the Nacimiento Reservoir. MCWRA has recently coordinated efforts with the San Luis Obispo County Flood Control and Water Conservation District to implement the Nacimiento Water Project, which includes construction of a pipeline and appurtenant facilities from Nacimiento Reservoir south to the communities of Paso Robles, Templeton, Atascadero and San Luis Obispo to convey the District’s existing water entitlement from the reservoir to areas of use.

Average annual flows to the ocean from the Salinas River are around 360,400 AFY,[18] most of which occurs during the period of November through March. This period corresponds to the months of peak seasonal rainfall and coincides with a seasonal reduction in irrigation activities in the valley. During the spring and summer months, the reservoirs on the Nacimiento and San Antonio Rivers regulate flow to maximize groundwater recharge via the Salinas River channel. A natural clay layer underlies the river in the northern portion of the valley, which inhibits natural recharge in this area. Previous reservoir operations maintained flow as far north as the Spreckels area. Since April 2010, with the implementation of the Salinas Valley Water Project, flows are managed to provide increased recharge in the Salinas River channel, and deliver river water from the Salinas River Diversion Facility to the seawater intrusion area, thus reducing the pumping stress on the aquifer system, and reducing seawater intrusion advancement.

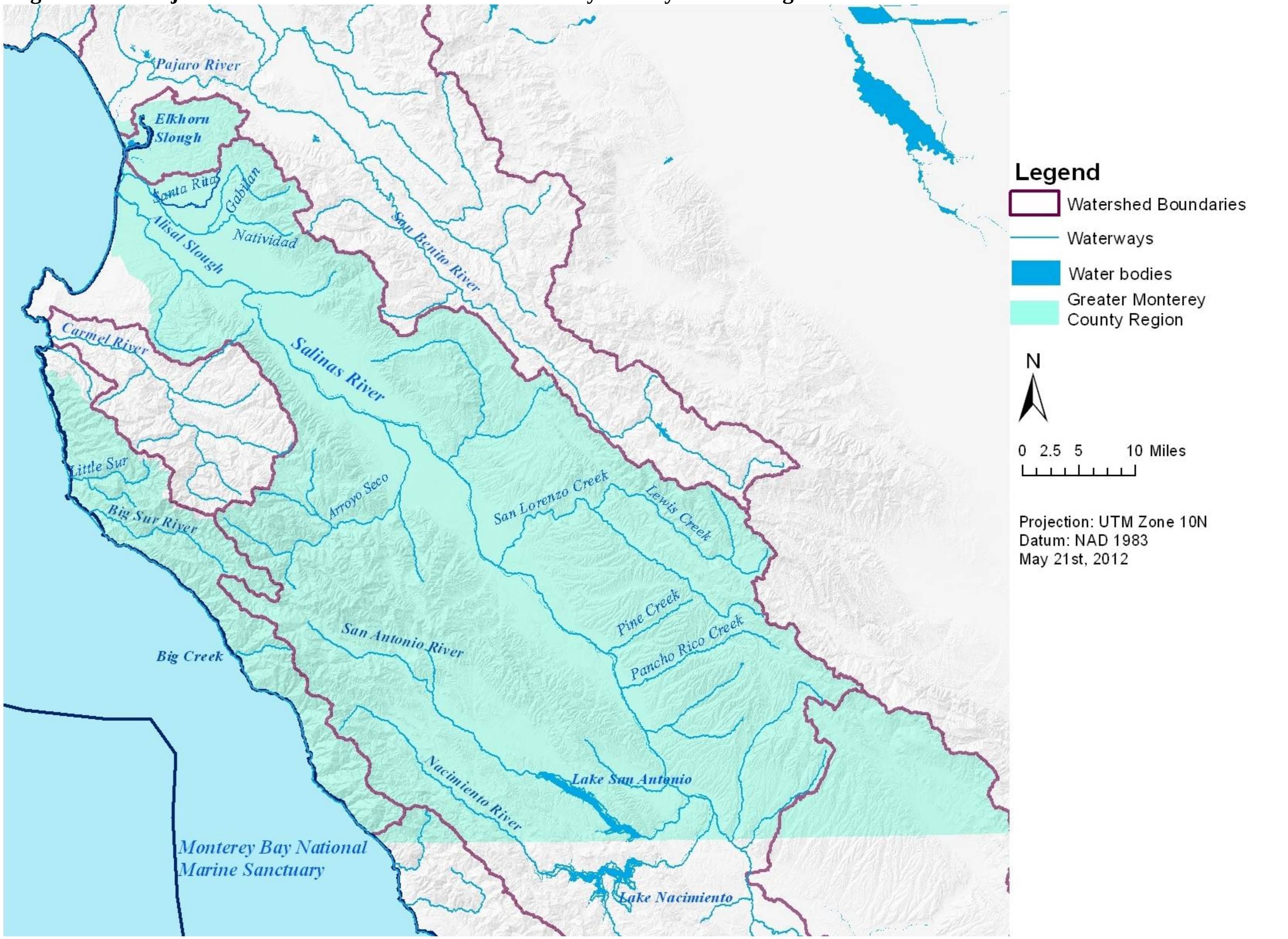
To the northeast of the Salinas River watershed is the smaller Gabilan Creek watershed, which contains five waterways—Gabilan Creek, Alisal Creek, Natividad Creek, Santa Rita Creek, and Tembladero Slough—along with the historic Carr Lake, a 450-acre former wetland and seasonal lake in the City of Salinas now primarily under agricultural production. The Gabilan Creek watershed, which includes the City of Salinas, is one of the most polluted watersheds emptying into the MBNMS. The Salinas Reclamation Ditch and Tembladero Slough are tied for third in having the most pollutant impairments identified on the 303(d) on the Central Coast, each listed with 14 pollutant impairments. Moss Landing Harbor, which lies at the bottom of the Gabilan watershed, is listed for 10 pollutant impairments, including pesticides, toxicity, pathogens, and sediment.

In the Big Sur portion of the region, major rivers include the Big Sur River, Little Sur River, and Big Creek, as well as numerous coastal creeks. The Big Sur River was designated a Wild and Scenic River in 1992. Major tributaries to the river include Pfeiffer-Redwood, Juan Higuera, and Pheneger Creeks. The Big Sur River flows in a northerly direction through the Big Sur Valley, at the north end of which lies an extensive floodplain and lagoon. The Big Sur River has a drainage area of about 61 square miles and an average annual runoff of 64,900 AFY (based on USGS stream gauge records), with peak flows in January.

Figure B-10 on the following page illustrates the major surface water bodies in the Greater Monterey County IRWM Region.

[18] Source: Annual data report on United States Geological Survey (USGS) website: http://wdr.water.usgs.gov/wy2010/pdfs/11152500.2010.pdf

Figure B-10: Major Surface Waters in the Greater Monterey County IRWM Region



B.3.3.b Groundwater Basins

Groundwater is the main source of water for most water users in the planning region with the exception of residents along the Big Sur coast, who depend entirely on surface water and shallow wells for their water supply, and of residents in an area near Greenfield in the Salinas Valley, who have a diversion from the Arroyo Seco River. The largest groundwater basin in the planning region is the Salinas Valley Groundwater Basin. The basin is located entirely within Monterey County and consists of one large hydrologic unit comprised of five subareas: Upper Valley, Arroyo Seco, Forebay, Pressure, and East Side. These subareas have different hydrogeologic and recharge characteristics, though they are not separated by barriers to horizontal flow and water can move between them. The Upper Valley, Arroyo Seco and Forebay subareas are unconfined and in direct hydraulic connection with the Salinas River.

Other, considerably smaller groundwater basins in the planning region include Lockwood Valley, Cholame Valley, and Peach Tree Valley basins at the southern end of the county, Paso Robles Groundwater Basin, about a quarter of which lies in Monterey County and the remainder in San Luis Obispo County, and a portion of the Pajaro Valley Groundwater Basin at the northern end of the county. Figure B-11 illustrates the groundwater basin boundaries in the Greater Monterey County IRWM region, and Figure B-12 illustrates the subareas of the Salinas Valley Groundwater Basin.

Figure B-11: Major Groundwater Basins in the Greater Monterey County IRWM Region

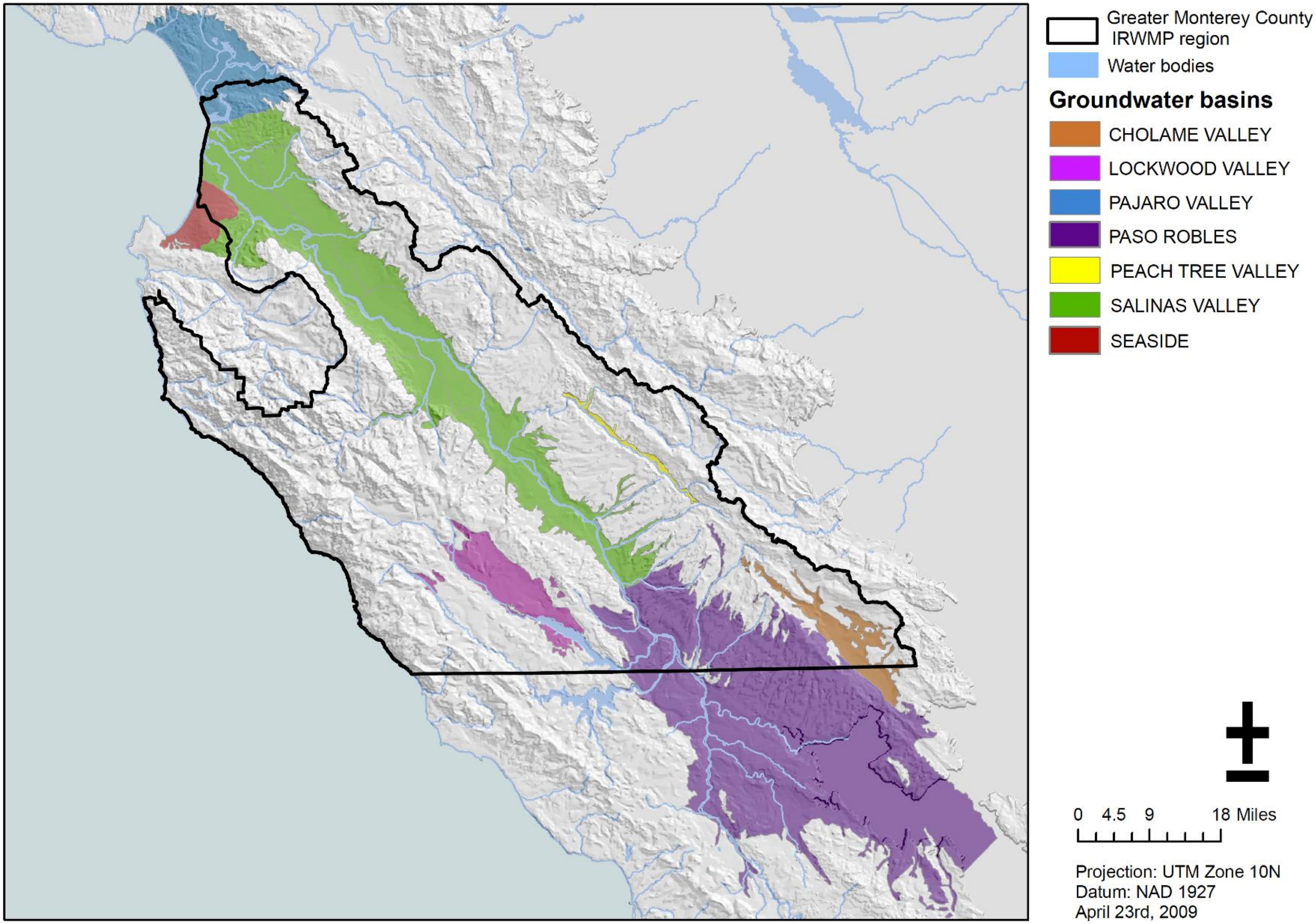
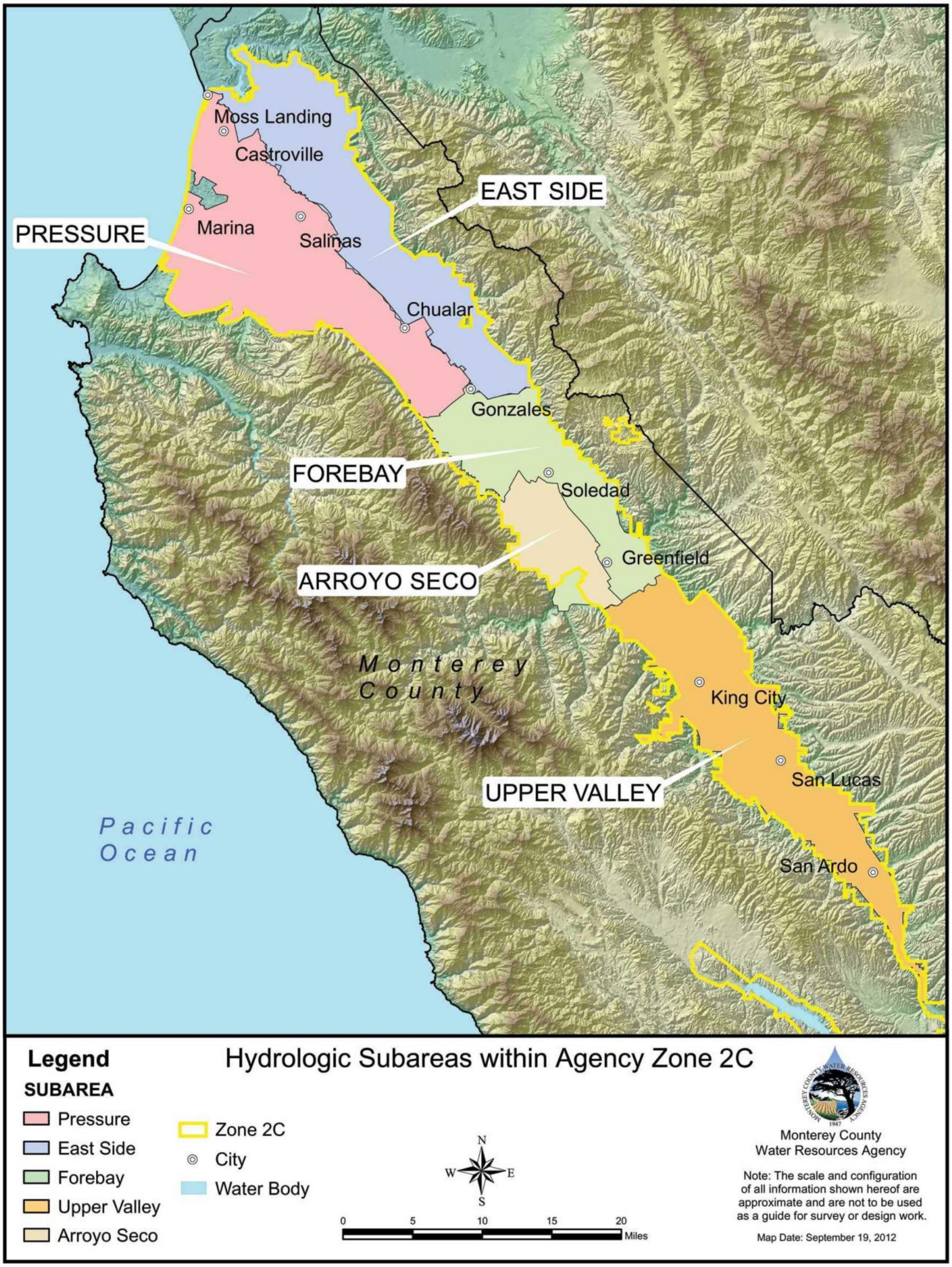


Figure B-12: Subareas of the Salinas Valley Groundwater Basin



According to the 2010 MCWRA Ground Water Extraction Data Summary Report, total groundwater pumping from the Agency's Zones 2, 2A and 2B of the Salinas Valley Groundwater Basin (shown on Figure B-12) in the 2010 reporting year was 460,443 AF. This figure is based on reporting from 97 percent of the 1,846 wells in the Salinas Valley for the 2010 reporting year. Note that data is submitted by individual reporting parties and is not verified by Agency staff. Agricultural pumping accounted for 90.4 percent of total groundwater pumping and urban uses accounted for the remaining 9.6 percent of the reported extractions, as shown in Table B-4 below.

Table B-4: 2010 Total Extraction Data by Basin Subarea and Type of Use

Subarea	Agricultural Pumping Reported (AF)	Urban Pumping Reported (AF)	Total Pumping Reported (AF)
Pressure	87,880	15,663	103,544
East Side	74,512	16,788	91,300
Arroyo Seco and Forebay	125,145	7,002	132,147
Upper Valley	128,883	4,568	133,452
Total Reported	**416,421**	**44,022**	**460,443**

Source: 2010 MCWRA Ground Water Extraction Data Summary Report, with 97% reporting.

Groundwater recharge in the Salinas Valley is principally from infiltration from the Salinas River, Arroyo Seco, and to a much less extent, other tributaries to the Salinas River, and from deep percolation of rainfall. Both natural runoff and conservation releases from Nacimiento and San Antonio Reservoirs contribute to the flow in the Salinas River. It is estimated that stream recharge accounts for approximately half of the total basin recharge. The recharge area is generally believed to end at a point between Chualar and the City of Salinas. Average precipitation in the Salinas Valley ranges from 15 to 60 inches in the mountain ranges on either side of the valley, and from 10 to 15 inches within the valley itself. Most of the precipitation occurs in winter, from November through March. Deep percolation of applied irrigation water is the second largest component of the groundwater budget, but because it represents recirculation of existing groundwater rather than an inflow of "new" water, it is not considered a source of recharge. Below is a more detailed description of the five subareas of the Salinas Valley Groundwater Basin.

The Upper Valley subarea includes approximately 99,000 acres near the south end of the Salinas Valley from Greenfield to Bradley. Groundwater recharge to the Upper Valley subarea occurs primarily from percolation in the channel of the Salinas River. The Forebay subarea, from Gonzales to Greenfield, consists of approximately 60,000 acres of unconsolidated alluvium. Principal sources of recharge to the Forebay subarea are percolation from the Salinas River and groundwater outflow from the Upper Valley and Arroyo Seco subareas.

The Arroyo Seco subarea consists of approximately 22,000 acres of land located on the west side of the Salinas River between Soledad and approximately two miles south of Greenfield. The principal source of groundwater replenishment in the Arroyo Seco subarea is percolation from the Arroyo Seco River and its tributary, Reliz Creek. Average annual flow in the Arroyo Seco River is approximately 40 percent of average annual flow in the Salinas River. This predominance of flow from the Arroyo Seco River precludes flow in the Salinas River from recharging the upper portion of the Arroyo Seco Cone even though the area is in hydraulic continuity with the alluvium of the Salinas Valley.

The Pressure subarea includes approximately 114,000 acres between Gonzales and Monterey Bay. It is composed mostly of confined and semi-confined aquifers separated by clay layers (aquicludes) that limit the amount of vertical recharge. Three primary water-bearing strata have been identified in the Pressure subarea: the 180-Foot Aquifer, the 400-Foot Aquifer, and the Deep (900-Foot) Aquifer. The Deep Aquifer has only recently begun to be used as a water supply source. The aquifer is being tapped near the coast for both urban and agricultural uses, by entities including the Marina Coast Water District (MCWD) which is using Deep Aquifer water to replace groundwater in the shallower aquifers that is unusable due to seawater intrusion, the Castroville Community Services District, the Monterey Dunes Colony, and by some agricultural users. The 180-Foot, 400-Foot, and Deep Aquifers are separated by aquitards, although some vertical recharge occurs locally where the aquitards are thin or absent. The uppermost aquitards allow some limited recharge from the Salinas River directly to the 180-Foot Aquifer in the area near Spreckels. The areas of thin or absent aquitards also allow some interconnection between the shallow 180-Foot and deeper 400-Foot Aquifers. The three aquifers of the Pressure subarea are all situated below sea level; there is hydrologic continuity with the ocean in all three aquifers.

The East Side subarea consists of 87,000 acres and includes unconfined and semi-confined aquifers in the northern portion of the basin that historically received some of their recharge from percolation from stream channels on the west slope of the Gabilan Range. As a result of extractions in excess of recharge, the declines in groundwater level in the East Side subarea have increased subsurface recharge from the Pressure subarea and the Forebay subarea. The groundwater level in the East Side subarea is declining more rapidly than any other subarea in the Salinas Valley basin. The inflow from the Pressure and Forebay subareas is now a larger source of recharge than the stream channels coming from the Gabilan Range.

Other, considerably smaller groundwater basins in the planning region include a portion of the Pajaro Valley Groundwater Basin in the North County area, Lockwood Valley, Cholame Valley, and Peach Tree Valley basins at the southern end of the county (located entirely within Monterey County), and a portion of the Paso Robles basin (approximately a quarter of which is located in Monterey County and the remainder in San Luis Obispo County).

The only source of groundwater recharge in the North County area, except for the extreme southwestern portion of that area, is rainfall. This area has significant water supply and water quality problems in many of its aquifers, including falling water levels in its eastern areas, seawater infiltration and intrusion in the western areas, and nitrate ion contamination due to septic tank proliferation and the historic use of commercial fertilizers (LandWatch Monterey County 2008).

B.3.3.c Reclaimed Water

The MCWRA, in partnership with the MRWPCA, built two projects to retard the advancement of seawater intrusion: a water recycling facility at the Regional Treatment Plant and a reclaimed water distribution system that delivers recycled water to approximately 12,000 acres of agricultural users near Castroville. The MRWPCA owns and operates the regional wastewater treatment plant at the northern end of the City of Marina. Wastewater from the Monterey Peninsula, Salinas, Marina, Moss Landing and the Ord Community is conveyed to the Monterey County Water Recycling Plant for processing. The plant has the capacity to generate approximately 21,600 AFY of recycled water. Of that amount, 13,300 AFY of tertiary treated recycled water is delivered directly to the Castroville area for agricultural irrigation during the irrigation season (the Castroville Seawater Intrusion Project, or CSIP); the remaining 8,300 AFY of available capacity would be generated during the non-irrigation season, but cannot directly be delivered for irrigation purposes due to current lack of seasonal storage facilities (though plans exist to expand the current storage facilities, as described in Section B.5.5.a below).

The CSIP effort uses almost all of the recycled water from the regional generating facility during the summer months, to the extent that there is virtually no wastewater discharged from the regional wastewater treatment plant during peak agricultural irrigation season. The MCWD has recycled water rights to a small fraction of the summer-time recycled water flows and is proposing to distribute that recycled water to regional golf courses, municipalities, and institutions for the irrigation of large landscapes and public common areas. This project is called the "Regional Urban Water Augmentation Project" (RUWAP), and is included as a proposed project in this IRWM Plan. The project will provide service largely to the developed (and developing) parts of the Ord Community and will be supported by developer resources paid to the Fort Ord Reuse Authority (FORA).

The Groundwater Replenishment Project is another reclaimed water project in the Monterey Bay area, located in the adjacent Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM region. The Groundwater Replenishment Project will involve further purification of tertiary treated recycled water at the MRWPCA Regional Treatment Plant, which will then be injected into the Seaside Groundwater Basin. The process will recharge the Seaside aquifer and help prevent seawater intrusion. Though the Groundwater Replenishment Project will address water supply issues on the Monterey Peninsula, the Greater Monterey County IRWM region would indirectly benefit by virtue of its neighbor's water supply shortfalls being addressed.

The City of Soledad owns and operates wastewater treatment plant facilities located one mile southwest of the City. The City completed construction of a new 5.5 million gallons/day (MGD) water reclamation facility at the wastewater treatment plant in February 2010, with a plan to provide tertiary treated water for agricultural and urban landscape irrigation, but had not yet constructed the delivery system. Through Round 1 of the Proposition 84 IRWM Implementation Grant program, the City has received funds to construct the recycled water pump station and design and construct the transmission mains needed to connect the recycled water transmission mains already constructed to the pump station. Completion of this project will enable delivery of recycled water to multiple landscaped areas currently being irrigated with potable water. The project will also include a feasibility study and preliminary conceptual design for the neighboring communities of Gonzales and Greenfield for delivery of their cities' wastewater to the Soledad Water Reclamation Facility for processing. The City plans to build a second facility (the Scalping Plant) by the year 2028, and assuming that plant is built and on line, the two facilities together are projected to produce approximately 6.1 MGD. At this capacity, up to 6,800 AFY of water could be produced for agricultural and urban landscape irrigation.

B.3.3.d Desalted Water

Desalination has been discussed and studied in Monterey County since the 1980s to augment existing, regional, groundwater and surface potable water supplies. One desalination plant currently exists in the Greater Monterey County region. The MCWD owns a small seawater desalination plant that has a capacity of 300 AFY, located at the District's former wastewater treatment plant site on Reservation Road. The source water for the plant comes from a shallow well located on Marina State Beach. This was constructed as a pilot facility, used to verify that adequate seawater supply could be produced from beach wells, and to test the use of beach injection wells for the disposal of brine. The Monterey Bay is a national marine sanctuary, so open ocean intakes and discharges are not allowed. The facility has been idle for several years, though MCWD has signed a developer agreement that obligates the District to re-operate the facility if needed. The supply is currently allocated to the Ord Community under an agreement with three developers in the Marina portion of the Ord Community (MCWD 2011).

MCWD, MCWRA and California American Water (CalAm) have worked together and with other interested agencies and persons during the past decade to develop desalination to augment regional water supplies. The Monterey Peninsula (adjacent IRWM region) needs to replace their current water supply with another water source to stop illegal withdrawals from the Carmel River. A proposed solution is desalination. To date, different desalination concepts and locations have been analyzed in different environmental documents certified by MCWD and by the California Public Utilities Commission (CPUC) under the CEQA. There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a combined 10 MGD of product water. Intake facilities would include intake wells and a pipeline to convey extracted water to desalination facilities for treatment. A great deal of work has been done by MCWD, MCWRA, and CalAm to develop a plant that has slant wells for the seawater intakes. Desalination facilities would include a pretreatment system, an RO system, a post-treatment system, clearwell tanks, and brine disposal. The proposed plant could utilize the MRWPCA's existing ocean outfall for the brine disposal. At the time of the writing of this report, there is not a definitive solution developed for desalination, though the timeline to provide the alternative water source for the Monterey Peninsula is January 1, 2017.

B.3.3.e Floodwater and Flood Management

Floodwaters and floodplains are part of the collective water system in the Greater Monterey County IRWM region and must be considered alongside the other water systems being managed. The Flood Protection and Floodplain Management goal in this IRWM Plan is to "develop, fund, and implement integrated watershed approaches to flood management through collaborative and community supported processes." Plenty of opportunities exist in the region to increase integrated flood management, and the RWMG hopes to achieve that objective by promoting integrated flood management projects through the IRWM planning process. The following section briefly describes floodwater and flood management in the Greater Monterey County region. A more detailed discussion is included as a separate chapter of this Plan (Section C, Flood Management).

Flooding is a major issue in the Greater Monterey County IRWM region. The damages caused by flooding in the Salinas Valley today are far more substantial than they were a century ago. Along the Big Sur coast, streams and rivers draining the steep coastal mountains are subject to short, intense floods, capable of producing significant damage to property. Historic records from 1911-2007 show flooding and flood damage to have occurred on a fairly regular basis (every few years) within Monterey County.

The agency with primary responsibility for flood control and floodplain management in Monterey County is the MCWRA. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal. In addition, several other organizations—most notably the RCD of Monterey County and the NRCS—contribute significantly to flood control and floodplain management efforts in the region through sediment and erosion control programs and grant incentives, though they have no jurisdictional flood control authority per se.

The MCWRA employs both structural and non-structural approaches to flood control and floodplain management in the County. Structural approaches include the Nacimiento and San Antonio Dams, constructed in 1957 and 1967 respectively. The agricultural community funded construction of both the Nacimiento and San Antonio Reservoirs. Nacimiento Dam is a large earthfill dam, constructed primarily for flood control and water supply (including percolation into the Salinas Valley aquifer); recreational benefits were also realized after construction was completed. The dam and reservoir are located in San Luis Obispo County and are owned and operated by MCWRA. The drainage basin for Nacimiento Reservoir covers 324 square miles with half of the basin area in Monterey County and the other half in San Luis Obispo County. San Antonio Dam is an earthfill dam also owned and operated by MCWRA. Like the Nacimiento Reservoir, the San Antonio Reservoir is operated for flood control and water supply (including groundwater percolation). The dam is located approximately seven miles southwest of Bradley on the San Antonio River in Monterey County, and has a 330 square mile watershed.

The Salinas Reclamation Ditch, originally named Reclamation Ditch District No. 1665, was constructed in 1917 to drain the marshlands in the northern Salinas Valley for agricultural and urban uses. The ditch was an enlargement of an existing waterway (Gabilan Creek) that connected a series of seven shallow lakes roughly between the City of Salinas and Castroville. A 2005 report developed by the Central Coast

Watershed Studies (CCoWS) team at California State University Monterey Bay for the MCWRA (*Final Report: Monterey County Water Resources Agency—Reclamation Ditch Watershed Assessment and Management Strategy*) describes the development of the Reclamation Ditch as follows:

> *The original hydrology of the Watershed was somewhat different than what it is today. Gabilan Creek and Natividad Creek flowed into Carr Lake, a natural basin near the center of Salinas. To the south, the Alisal Watershed drained into Smith Lake. Between Smith Lake and the southern border of Salinas were two other small lakes, Heinz and Mud Lakes. These basins received local runoff and presumably overflow from Smith Lake during heavy storms.*
>
> *The chain of lakes continued to the Northwest, between Salinas and Castroville. These lands were characterized by rolling, grass covered hills, each forming small individual drainages (Cozzens, 1944). At the end of each of these small drainages were natural depressions that formed small lakes, or ponds, during winter (Bechtel Corp., 1959). They included, Merritt Lake, Espinosa Lake, Santa Rita Slough, Vierra Lake, Fontes Lake, Boronda Lake, Markley Swamp, and Mill Lake. The lakes naturally had poor drainage and were only connected during periods of high runoff. The whole system ultimately drained into Tembladero Slough and into Moss Landing Lagoon (now Moss Landing Harbor) (Cozzens, 1944; Bechtel Corp., 1959).*
>
> *Starting as early as the mid-19th Century, attempts were made to drain portions of the swamps, for use as productive farmlands. Much of the initial work was conducted by Chinese laborers. In the winter of 1890, Carr Lake filled and flooded its adjacent lands, and eventually spilled into the City of Salinas. As a result, Jesse D. Carr modified, or increased, the slow natural drainage of the lake and in doing so, reclaimed approximately 1,475 acres of the lake bottom (Anderson, 2000; Breschini et al., 2000). Eventually, this led to the draining of all the major lakes and much of the adjacent swamplands between Salinas and Castroville. From then on, protecting the newly created valuable farmlands from the natural flooding would become a constant battle.* (Casagrande and Watson, 2005, Part A, p. 31, including their original citations)

The Salinas Reclamation Ditch watershed area covers approximately 157 square miles of rural, agricultural, and urban lands located in northern Monterey County and a small mountainous region in San Benito County. While the original purpose of the Reclamation Ditch was drainage (for land reclamation), the Ditch came to be used and depended upon by local residents as a flood control channel. Rapid agricultural and urban development throughout the 1900s, however, significantly changed the hydrology of the watershed, causing a dramatic increase in the rate and amount of runoff from storms. By the end of the 1950s it was clear that the system lacked capacity to manage the flooding from storms and from increased water runoff that resulted from expanded urbanization and agricultural development (Casagrande and Watson 2005).

In 1967, the Monterey County Flood Control and Water Conservation District (now MCWRA) took over maintenance on portions of the Salinas Reclamation Ditch from the Northern Salinas Valley Mosquito Abatement District. After two major floods in the 1990s that resulted in substantial damage to agricultural lands west of Salinas, the MCWRA initiated an evaluation of the Reclamation Ditch and a committee was convened to assist MCWRA in planning for an improved drainage system (1999). That committee, the Reclamation Ditch Improvement Plan Advisory Committee (RDIPAC), has made several recommendations for improvements and provided guidance during the development of several studies such as the Potrero Tide Gates study (September 2000) as a result of changes in the watershed. The implementation of those recommendations is included as a proposed project in this IRWM Plan.

As noted above, the original function of the Reclamation Ditch was intended to "reclaim lands" for other uses, specifically agricultural uses. As the watershed characteristics changed throughout the decades, the Reclamation Ditch's function changed to providing some relief from local flooding, though it is not a solution for flood control protection. The *MCWRA Reclamation Ditch Watershed Management Strategy* (Casagrande and Watson 2005) suggests several possible management options for maintaining the Salinas Reclamation Ditch, reflecting a more integrated flood management approach. Goals include:

- Improve water quality
- Reduce flooding of developed land
- Create parklands and natural areas
- Determine steelhead status
- Protect rare and special status species
- Reduce mosquitoes
- Facilitate food safety and agricultural pest control
- Reduce harbor sedimentation
- Achieve sustainable water supply
- Maintain economic viability

Non-structural approaches to flood management include land use management tools such as regulation and flood insurance, and emergency response systems. MCWRA developed the *Monterey County Floodplain Management Plan* in 2002 with the goal of creating an action plan to minimize the loss of life and property in areas where repetitive losses have occurred, and to ensure that the natural and beneficial functions of the County's floodplains are protected. Updated in 2008, the plan describes the County's flood control system (infrastructure), identifies flood zones defined by the Federal Emergency Management Agency (FEMA), including maps depicting Repetitive Loss Properties (RLPs) and 100-year floodplains, provides a general hazard assessment (including atmospheric, geologic, hydrologic, seismic, fire, system failure, and general flood hazards), assesses the flood hazards of specific waterways in the County in terms of repetitive losses, and provides an implementation plan for flood mitigation and for mitigation of RLPs.

B.3.3.f Estuarine, Coastal, and Ocean Waters

As noted previously, the Greater Monterey County region is situated adjacent to the federally protected MBNMS. Within the MBNMS are four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).[19] The Elkhorn Slough National Estuarine Research Reserve, part of the MBNMS, is located in the northern coastal area of the Greater Monterey County IRWM region, and is one of the few coastal wetlands remaining in California. The slough provides some of the most important freshwater marsh and brackish marsh habitat for wildlife in California. Another significant estuary within the Greater Monterey County region is Moro Cojo Slough, located directly south of the Elkhorn Slough. The Moro Cojo State Marine Reserve protects all marine life within its boundaries. These estuarine, coastal, and ocean waters are described in more detail in Section B.3.2.b, above.

B.3.3.g Wastewater

Wastewater treatment services are provided in the northern part of the Greater Monterey County region by the Monterey Regional Water Pollution Control Agency (MRWPCA). The MRWPCA provides

[19] Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

regional wastewater conveyance, treatment, disposal, and recycling services to all of the sewered portions of northern Monterey County, including in the Greater Monterey County IRWM planning region the City of Salinas, Boronda, Marina, Castroville, Moss Landing, the Ord community, and some unincorporated areas in northern Monterey County. The MRWPCA owns the Regional Treatment Plant on the Salinas River.

As noted above, the MRWPCA, in partnership with the MCWRA, built two projects to retard the advancement of seawater intrusion: a water recycling facility at the Regional Treatment Plant and a reclaimed water distribution system that delivers recycled water to approximately 12,000 acres of agricultural users near Castroville. Wastewater from the Monterey Peninsula, Salinas, Marina, Moss Landing and Ord Community is conveyed to the Monterey County Water Recycling Plant for processing. The wastewater at the Regional Treatment Plant undergoes secondary treatment with trickling filters, followed by activated carbon, dual media filtration, and chlorine disinfection for recycled water. MRWPCA Regional Treatment Plant has a capacity to treat 29.6 million gallons/day (MGD) of wastewater. During the summer months, 100 percent of the treated effluent (approximately 4,600 AFY) from the Regional Treatment Plant is recycled during the summer months for agricultural irrigation of artichokes and a variety of crops. Wastewater is not recycled during the winter months, but is discharged without chlorination to Monterey Bay (Cal Water 2010b).

For other areas of the planning region, wastewater treatment is provided by the municipalities, water districts, or private water utilities that service those areas, or in more rural regions (such as in Big Sur), via septic tanks. Municipalities in the region include Gonzales, Greenfield, King City, Soledad, Marina, and Salinas (the latter two of which are served by MRWPCA). The City of Gonzales's municipal wastewater treatment plant operates at 1.30 MGD and serves all residential, commercial and industrial customers in the City (LAFCO 2010a). The City of Greenfield's Wastewater Treatment Plant has a capacity to receive a flow of 2.0 MGD, while the plant currently provides a peak month average daily flow of 0.983 MGD (LAFCO 2010b). The King City Wastewater Treatment plant uses primary and secondary ponds, with facilities for non-recoverable industrial wastewater. The average flow capacity is 1.2 MGD, which is well below the design capacity of 3.0 MGD. In June 2010 the City Council approved a contract of over $900,000 to make improvements to the wastewater ponds including expansion of capacity (LAFCO 2010c).

While the MRWPCA Regional Treatment Plant provides the residential wastewater service for the Salinas service area, the City of Salinas owns and operates an Industrial Wastewater Treatment Plant with a capacity to treat 4 MGD (but currently receives 2 MGD from industrial customers in Salinas). Treated wastewater from the industrial wastewater treatment plant is not recycled (LAFCO 2010d).

The City of Soledad completed an upgrade and expansion of its wastewater treatment plant in January 2010. The plant capacity was elevated from 3.1 MGD to 5.5 MGD. With completion of the project, the plant meets the effluent limits adopted by the State Water Resources Control Board (SWRCB). In addition, the City of Soledad contractually provides wastewater treatment services to two State prisons that lie within City boundaries, with inmate populations of approximately 6,350 and 3,800 (LAFCO 2010e).

Several water and community services districts provide wastewater treatment services in the more rural areas of the Salinas Valley. The Chualar Community Service Area was formed in 1993 and provides stormwater management and wastewater disposal services to residential and commercial users in the unincorporated village of Chualar, a 175-acre service area located about nine miles south of Salinas and comprising approximately 1,190 people. The wastewater treatment plant does not currently use best available technology and is subject to flooding, as occurred in 1995 (LAFCO 2006a).[20] The San Lucas County Water District is an independent special district formed in 1965 to provide potable drinking water and sewer services (collection, treatment and disposal) to residential and commercial users within the unincorporated community of San Lucas, located in the Salinas Valley about nine miles south of King City with a population of approximately 270 people. The San Ardo Water District is an independent special district created in 1955 for the delivery of potable water, sewer services, and wastewater disposal and treatment services to the unincorporated community of San Ardo, located about 10 miles south of San Lucas and serving a population of approximately 520 people (LAFCO 2006c).

In 2003, CalAm was granted permission by the CPUC to create its Monterey Wastewater Division and Service Area, and acquired the assets of Las Palmas Ranch, Laguna Seca Ranch, and the Carmel Valley County Sanitation District water systems. The Las Palmas Ranch Wastewater System is made up of two plants, that combined, are designed to handle 235,000 gallons per day, serving approximately 1,000 connections. By the end of 2004, CalAm was granted permission to purchase and operate wastewater operations in the communities of Spreckels, Oak Hills, and Indian Springs, which together serve approximately 900 connections.[21]

See Table B-6 in Section B.4.2.b below for a summary of water supply (for purveyors with more than 200 connections) and wastewater treatment providers in the Greater Monterey County region.

B.4 INTERNAL BOUNDARIES

Internal boundaries of relevance to IRWM planning within the Greater Monterey County region include political boundaries (i.e., county, municipal, and military base boundaries); service areas of individual water, wastewater, and flood control districts; service areas of land use agencies; groundwater basins; and watersheds.

B.4.1 Political Boundaries

The Greater Monterey County IRWM region includes most of the land area of Monterey County, as well as a small portion of San Benito County where the Salinas River watershed extends outside of Monterey County along San Benito County's western border. The region includes six incorporated cities, which comprise 69 percent of the region's population (and 56 percent of the county population as a whole). The six cities include: Salinas, Soledad, Marina, Greenfield, King City, and Gonzales. Also included within the region are several unincorporated communities, including in the Salinas Valley: Prunedale (the largest community with a population of 17,560), Castroville (population 6,481), and the significantly smaller communities of Moss Landing, Las Lomas, Spreckels, Chualar, San Lucas, San Ardo, Lockwood, Bradley, and Parkfield. Along the Big Sur coast, unincorporated communities include: Big Sur, Lucia, and Gorda. Population for the cities and communities of the region are shown in Table B-5 below.

[20] Population estimates for Chualar based on 2010 US Census data.
[21] Source: Email communication with CalAm staff (and IRWM Plan Coordinator), December 13, 2011.

Table B-5: 2010 Population for Cities/Communities in Region

Community	Population
Big Sur CCD[a]	1,710
Boronda CDP	1,710
Bradley CDP	93
Castroville CDP	6,481
Chualar CDP	1,190
Elkhorn CDP	1,565
Gonzales city	8,187
Greenfield city	16,330
King City city	12,874
Las Lomas CDP	3,024
Lockwood CDP	379
Marina city	19,718
Moss Landing CDP	204
Pine Canyon CDP	1,822
Prunedale CDP	17,560
Salinas city	150,441
San Ardo CDP	517
San Lucas CDP	269
Soledad city	25,738
Spreckels CDP	673
Toro Park CCD[b]	10,680
Monterey County	*415,057*

Source: 2010 US Census. “CCD” means “Census County Division.” “CDP” means “Census-designated Place.”
a. This geographic area was called “Coastal CCD” in 2000 and “Coastal Division” from 1960-1990.
b. This geographic area was called “Toro CCD” in 2000 and “Toro Division” from 1960 – 1990.

Military areas in the region include Fort Hunter Liggett, a United States Army Reserve command post encompassing 165,000 acres on the eastern side of the Santa Lucia Mountains, and Camp Roberts, a National Guard training base located in southern Monterey County and northern San Luis Obispo County, encompassing approximately 17,000 acres within Monterey County. Figure B-13 below illustrates political boundaries within the Greater Monterey County region.

Figure B-13: Boundaries of Counties, Cities, Communities, and Military Areas in the Greater Monterey County IRWM Region

B.4.2 Service Areas of Water, Wastewater, and Flood Control Districts

B.4.2.a Water Supply Districts

Water supply in the region is managed by several agencies, both public and private. MCWRA, formed in 1947, is the primary water management agency for Monterey County and is responsible for managing, protecting, and enhancing water supply and water quality, as well as providing flood protection, in the County. A small portion of the Greater Monterey County region lies within the jurisdictional boundaries of the San Benito County Water District (SBCWD). This portion is in the northeastern portion of the region where the Salinas River watershed falls within San Benito County. The SBCWD was formed in 1953 to control, manage and conserve waters and provide water services to customers (primarily agricultural water users) within the district. In addition, a small portion of the planning area—in the northernmost section where the Greater Monterey County IRWM planning region abuts the Pajaro River Watershed IRWM planning region—lies within the jurisdictional boundaries of the Pajaro Valley Water Management Agency (PVWMA). The PVWMA was formed in 1984 to manage existing and supplemental water supplies to prevent further increase in and continue reduction of long-term overdraft, and to ensure sufficient water supplies within its boundaries.

B.4.2.b Service Areas for Major Water Purveyors and Wastewater Treatment Providers

Table B-6 below summarizes the water suppliers and service areas for connections greater than 200, and wastewater treatment providers in the Greater Monterey County IRWM region. Note that there are no water suppliers in the Big Sur coastal region with connections greater than 200.

Table B-6: Water Supply (Connections >200) and Wastewater Treatment Providers

Service Supplier	Service Area (within Greater Monterey County IRWM Region)	Population Served	Water Supply	Wastewater Treatment
Alco Water Service Company	Service areas within the City of Salinas – north and east sides	29,152	x	
California American Water Company	Toro Water Company	408	x	
	Ambler Park	396	x	
	Chualar	186	x	
	Las Palmas	1,046		x
	Indian Springs	180		x
	Oak Hills	460		x
	Spreckels	270		x
	Ralph Lane	28	x	
California State Parks	Julia Pfeiffer Burns State Park		x	
	Andrew Molera State Park		x	
	Pfeiffer Big Sur State Park		x	x
	Fremont Peak State Park		x	
California Utilities	Toro Area	1,100 connections +-		x
California Water Service Company	King City	10,260	x	
	Salinas District (including 70% of the City of Salinas, plus Bolsa Knolls, Las Lomas, Oak Hills, Country Meadows, Salinas Hills, and Buena Vista)	134,870	x	
Camp Roberts	National guard base	5,986	x	x
Castroville Community Services District	Community of Castroville	7,000	x	
Chualar Community Services Area	Community of Chualar	1,190		x
City of Gonzales	City of Gonzales	9,114	x	x
City of Greenfield	City of Greenfield	17,898	x	x
City of Soledad	City of Soledad	16,729	x	x

	Salinas Valley State Prison and Corrections Training Facility/Soledad Prison	11,200		x
Fort Hunter Liggett	Army base	5,500	x	x
King City	King City	12,874		x
Little Bear Water Company	Area southwest of King City	2,314	x	x
Marina Coast Water District	City of Marina and Ord Community	30,480	x	
Monte Del Lago Park	Monte Del Lago Mobile Home Community	750	x	
Monterey County Parks	Lake San Antonio		x	x
Monterey Regional Water Pollution Control Agency	City of Salinas, Marina, unincorporated areas within the County (plus Monterey Peninsula cities which are outside the GMC IRWM region)	250,000 (includes areas outside the IRWM region)		x
Pajaro Sanitation District operated by Monterey County Public Works	Las Lomas Area	3,024		x
Pajaro/Sunny Mesa Community Services District	Pajaro area (lies outside of IRWM region), Elkhorn, Prunedale area, plus Sunny Mesa and Hillcrest subdivisions	7,225	x	
Salinas Valley State Prison	Facility grounds in Soledad	5,719	x	
San Ardo Water District	Community of San Ardo	517	x	x
San Lucas County Water District	Community of San Lucas	269	x	x
Soledad Prison/Corrections Training Facility	Facility grounds in Soledad	7,175	x	
Spreckels Water Company	Community of Spreckels and Tanimura Antle Plant	673	x	

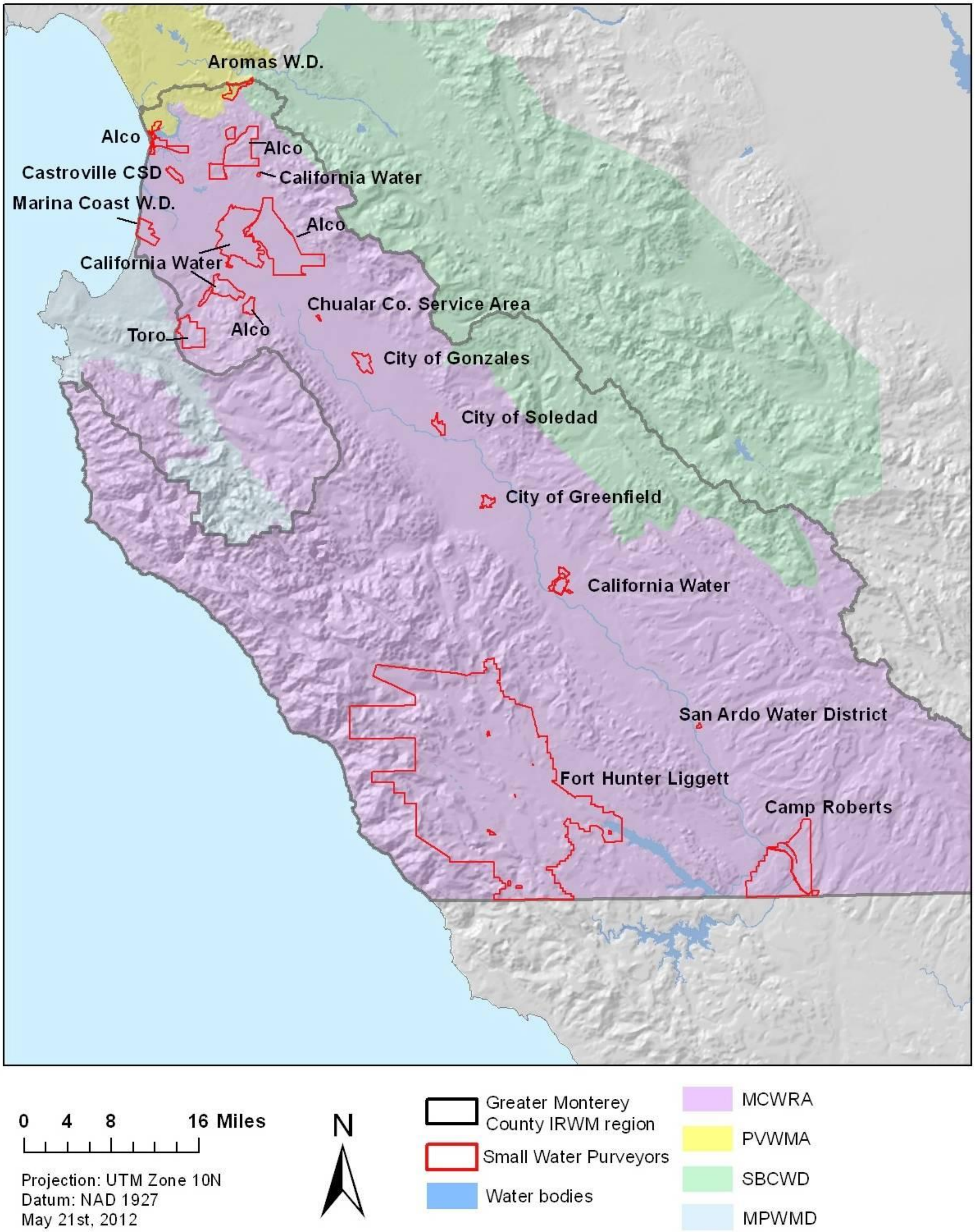
Source: 2007 Data from State of California, Department of Finance, compiled by Association of Monterey Bay Area Governments, except for the following:

- Alco population estimate based on email communication with Alco President, December 13, 2011.
- California American Water Company population from email communication with CalAm, December 13, 2011.
- California Water population estimates from King City 2010 UWMP and Salinas District 2010 UWMP;
- Castroville CSD population estimate based on email communication with CCSD General Manager, October 2011.
- Chualar CSD population estimate based on 2010 US Census data;
- City of Gonzales population estimate from LAFCO 2010 MSR for the City of Gonzales;
- City of Greenfield population estimate from LAFCO 2010 MSR for the City of Greenfield;
- King City population estimate for wastewater services based on 2010 US Census data;
- Las Lomas population estimate (for Pajaro Sanitation District) based on 2010 US Census data;
- Marina Coast Water District population estimate from MCWD 2010 UWMP;
- Pajaro/Sunny Mesa CSD population estimate from LAFCO 2006 MSR for the North County Area of Monterey County;
- San Ardo population estimate based on 2010 US Census data;
- San Lucas population estimate based on 2010 US Census data;
- Soledad population estimate from the Soledad 2010 UWMP;
- Spreckels population estimate based on 2010 US Census data.

Major water suppliers in the region include the MCWD, the Castroville Community Services District, the California Water Service Company, Alco Water Service Company, and the municipalities of Gonzales, Greenfield, Soledad, and King City. The U.S. Army and California State Parks supply water for use on their properties within the region. The majority of residents and businesses in the Big Sur coastal region obtain water from private wells and springs. California State Parks treats and provides its own water supply at each of the State Parks in Big Sur, including Andrew Molera State Park, Pfeiffer Big Sur State Park, Julia Pfeiffer Burns State Park, and Fremont Peak State Park, which lies within Monterey and San Benito Counties.

Figure B-14 on the following page illustrates the jurisdictional boundaries of the water management agencies and water districts in the region (MCWRA, SBCWD, and PVWMA) along with the boundaries of the Monterey Peninsula Water Management District (MPWMD), which manages water for the Monterey Peninsula area, adjacent to the Greater Monterey County IRWM planning area. The map also shows general boundaries for major water purveyors in the Greater Monterey County IRWM region.

Figure B-14: Water Supply Districts and Purveyors in the Greater Monterey County IRWM Region



The following provides a description of the major water purveyors in the Greater Monterey County IRWM region. (Note that wastewater providers are described above in Section B.3.3.g.)

Alco Water Service
Alisal Water Corporation, dba Alco Water Service (Alco), is an investor-owned public utility water company that has been providing public utility water service to the Alisal community, which was eventually incorporated into the City of Salinas, since 1932. Alco's rates and service quality are regulated by the CPUC and its water quality is regulated by both the California Department of Public Health (CDPH) and the CPUC. The CPUC also regulates the design, construction and operation of the utility's facilities. As of 2011, Alco maintains nine wells, six active wells and three standby wells with a combined total capacity of 15,136 million gallons per year and an existing pump capacity of 9,244 million gallons per year. Current demand, based on year 2010 figures, is approximately 1,381 million gallons of groundwater per year to the Salinas area.

At the City of Salinas's request, the CPUC conducted a complete review of Alco's water quality, water system and its operation, as well as its customer service in providing water service; the review was completed by the CPUC in 2009. The CPUC's review determined that Alco's water quality meets all State and Federal water quality standards, that Alco's water service to its customers meets the requirements set forth by the CPUC, and that Alco has sufficient production capacity and adequate facilities to provide service in its certificated service area, which includes the City of Salinas's Future Growth Area.

California American Water Company
California American Water Company (CalAm) is a regulated utility serving approximately 50 communities throughout the state with high-quality water and wastewater services. In the California Central Coast area, CalAm serves an estimated 120,000 people through more than 40,000 residential and business water service connections.[22] Within the Greater Monterey County IRWM Plan area, the company provides service to approximately 3,000 water and wastewater connections. Communities served within this area include Toro, Ambler Park, Las Palmas and Spreckels, which are all located between the Monterey Peninsula and Salinas Valley. Also included are the communities of Ralph Lane and Indian Springs in Salinas, Oak Hills in northern Monterey County and Chualar in southern Monterey County. All of these systems are independent of each other. All communities that are served by CalAm within the Greater Monterey County region draw their water supply entirely from the Salinas Valley Groundwater Basin.

The quality of water delivered to customers throughout the Monterey System meets or exceeds all State and Federal drinking water requirements. Groundwater pumped by many of the system's wells is of high quality, and requires no treatment other than disinfection, which is accomplished by chlorination. Water from wells serving Ambler Park is high in iron and manganese, and water from Toro and Ambler Park requires arsenic removal treatment. CalAm operates separate facilities for treating and filtering the raw groundwater from these wells prior to distribution.

California Water Service Company
California Water Service Company (Cal Water) is regulated by the CPUC and serves approximately 130,000 residents (70 percent of the urban users) in the City of Salinas and some of the surrounding areas, including the unincorporated communities of Bolsa Knolls, Las Lomas, Oak Hills, Country Meadows, Salinas Hills, and Buena Vista.[23] Alco Water Company serves the remaining portion of the City of

[22] Source for all information in this section: Email communication with CalAm staff from IRWM Plan Coordinator (December 13, 2011).
[23] Source for all information in this section regarding the Cal Water Salinas District: Cal Water 2010b.

Salinas.

Cal Water relies solely on groundwater sources from the Pressure and Eastside sub-areas of the Salinas Valley Groundwater Basin. The Pressure sub-area is a region of gradually declining groundwater elevations, and the groundwater level in the Eastside sub-area is declining more rapidly than any other sub-area in the Salinas Valley. The aquifers surrounding the City of Salinas have seen a reduction in groundwater storage and the encroachment of the saline front due to saltwater intrusion. The intruding seawater has advanced into the 180-Foot Aquifer to within one mile of Cal Water's closest well. Cal Water has shifted production as much as possible out of the 180-Foot and Eastside Aquifers and located it further south and more in the 400-Foot Aquifer of the Pressure area. Cal Water does not pump from the Deep (900-Foot) Aquifer.

The Salinas District has a total of 59 wells, including one leased well. In 2010, 42 of these wells were active and operational and one was in Standby status. The design capacity of the active operational wells is 30,990 gallons/minute (GPM), or an annualized equivalent of 49,987 AFY, a rate that could produce 44.6 MGD. The five-year average, average day demand is 18.4 MGD and the average maximum day demand is 30.1 MGD. The historic high for these parameters occurred in 2004 for average day at 19.4 MGD and in 2005 for maximum day at 31.8 MGD.

The drinking water delivered to customers in the Salinas District meets or surpasses all Federal and State regulations. However, over the years, some of the District's wells have experienced declines in water quality due to nitrates, volatile organic compounds (VOCs), MTBE, uranium, and iron and manganese. Since 1999 Cal Water has removed one well from service due to high levels of MTBE. Six wells during the past 13 years were placed on inactive status because of noncomplying water quality. The most common problem has been nitrates, which can be removed by treatment. Cal Water has installed nitrate treatment on four wells. Another emerging concern is MTBE, the additive used in gasoline, getting into the groundwater and contaminating well water. One well has been put on inactive status because of MTBE. Some wells have shown a trend toward increases in VOCs, which can be removed by activated carbon. A major future water quality concern is arsenic. There is a possibility that the State of California may set a lower arsenic standard such as 5 parts/billion (ppb) or even less. This new maximum contaminant level (MCL) could impact the availability of several wells for water production. In addition, two regional water quality conditions that may ultimately impact the availability and use of the Salinas water supply are seawater intrusion and nitrate contamination. A very aggressive well replacement program is needed to maintain adequate supply in the Salinas District.

Cal Water also serves approximately 10,260 residents in King City.[24] Groundwater is the sole source of water furnished to King City District customers. Although the aquifers of the Salinas Valley have been in a state of overdraft for many years, the City is not significantly impacted by the overdraft due to its proximity to the San Antonio and Nacimiento Reservoirs. The MCWRA releases flows from these reservoirs to provide groundwater recharge throughout the year. As a result, groundwater levels in the King City area have been remarkably stable, and have always recovered quickly after drought events.

The water supply for King City is obtained from Cal Water-owned wells and is pumped directly into the distribution system and into an elevated steel tank. There are currently six operating groundwater wells within the King City District. The design capacity of these wells is 10,100 GPM or 14.5 MGD, if operated continuously. The five-year average, average day demand is 1.70 MGD and the five-year average maximum day demand is 2.85 MGD. The historic high for these parameters occurred in 2004 at 1.82 MGD for average day and 3.07 MGD in 2006 for maximum day.

[24] Source for all information regarding the Cal Water King City District: Cal Water 2010a.

The drinking water delivered to customers in the King City District meets or surpasses all Federal and State regulations. However, while the Cal Water King City system has not experienced supply deficiencies, contaminates continue to threaten water supply reliability. Six of the King City wells have been deactivated because of elevated nitrate concentrations in the water produced. The MCL for nitrate in drinking water is 45 milligrams/liter (mg/L). In these six wells the MCL has been exceeded resulting in the well being taken out of service. Spreading of this condition to the remaining six wells would be a problem for the District. Loss of additional capacity could cause pressure loss during peak flow periods.

Castroville Community Services District

The Castroville Community Services District (CCSD), formed in 1952 as the Castroville Water District, serves more than 6,800 customers in the unincorporated town of Castroville through 1,567 connections. CCSD currently delivers approximately 1,000 AFY of water, all of which comes from the Pressure subarea of the Salinas Valley Groundwater Basin. The CCSD system encompasses approximately 13 miles of pipeline and includes two water storage tanks with a capacity of 1.1 million gallons. The stored water is distributed to customers via an average pumping of 800,000 gallons/day; however, CCSD has a maximum capacity to pump up to 4.5 MGD to meet peak demands if needed (LAFCO 2006b).

CCSD operates three production wells, with an estimated capacity of just under 5 MGD. Castroville's wells in the 180/400-Foot Aquifer of the Salinas Valley Groundwater Basin had been experiencing increased salinity (identified as chlorides and total dissolved solids) due to seawater intrusion. In 2007, CCSD drilled a new well, Well No. 2B, into the Deep (900-Foot) Aquifer to reduce pumping from the shallower aquifers. Water quality testing indicated that arsenic levels in the new well exceeded the MCL for drinking water. CCSD applied for and has received funds in Round 1 of the Proposition 84 IRWM Implementation Grant Program to complete construction of Well 2B, including arsenic removal treatment equipment, allowing the production drinking water from the Deep Aquifer to meet drinking water requirements. The CSIP, managed by MCWRA and described in Section B.3.3.c above, has successfully reduced agricultural water demand in the Castroville region and has consequently stopped most of the migration of seawater intrusion to areas directly west (coastward) of Castroville. Nonetheless, CCSD plans to move a number of its production wells east to ensure supply reliability.

City of Gonzales

The City of Gonzales provides potable water and wastewater treatment to a population of about 9,114. The City operates four production wells in the Pressure subarea. In FY 2010/2011 the City delivered 1,284 AF (418 million gallons) of potable water to its citizens and businesses from its four active wells. The City's water system has been operating on a reliable basis for many years even during periods of prolonged drought. Nitrates and MTBE have become constituents of concern at the Pressure 180-Foot level, which could threaten the water supply. However, the City has not found it necessary to consider groundwater treatment since it began sealing its wells at the 400-Foot level in 1988. The City's wells feed directly into the distribution systems which consist of one 1.0 MG and two 3.0 MG storage tanks for a total storage capacity of 7 MG. The municipal wastewater treatment plant currently operates at 1.30 MGD and serves all residential, commercial and industrial customers in the City.[25]

City of Greenfield

The City of Greenfield is the fastest growing city in Monterey County. Greenfield's 2010 population was estimated at 17,898, a 41.5 percent increase from 2000 (LAFCO 2010b). This percentage increase over the ten-year period was almost double that of any other city in Monterey County. According to the Greenfield General Plan for 2005-2025, the City's population is expected to reach buildout by 2025, more than doubling its size from the present population and exceeding 38,000 residents (note, the City's

[25] Sources: LAFCO 2010a; City of Gonzales website (November 2011: http://www.ci.gonzales.ca.us/public-work.php); and email communication with City of Gonzales Director of Public Works (November 30, 2011).

projections differ significantly from those of the Association of Monterey Bay Area Governments [AMBAG], which estimates a population of less than 30,000 by 2030).

The City of Greenfield Public Works Department is responsible for water supply and delivery in the City of Greenfield. The City utilizes local groundwater as its sole source of water supply. The City is located within the Forebay sub-basin of the Salinas Valley Groundwater Basin. The City's water system currently includes two storage tanks (a 1.0 MG tank and a 1.5 MG storage tank installed in November 2009), four operational wells (one of which is non-potable, used for irrigation), and over 17 miles of transmission and distribution pipelines. The City's 2005-2025 Water System Capital Improvement Plan (CIP) identified a need for total buildout storage of 3.75 MG (City of Greenfield 2008). The municipal water system has the capacity to pump approximately 8.0 MGD while the maximum current demand is reported at approximately 1.8 MGD (LAFCO 2010b). The City routinely tests its wells to ensure that the groundwater pumped meets US Environmental Protection Agency (EPA) and California Department of Public Health (CDPH) drinking water standards. The water quality of the primary wells is good and currently meets all regulatory standards (LAFCO 2006c).

The City of Greenfield also provides wastewater treatment services to city limit customers, consisting of primary treatment. The City's Wastewater Treatment Plant has a capacity to receive a flow of 2.0 MGD, while the plant currently provides a peak month average daily flow of 0.987 MGD.[26]

City of Soledad

The City of Soledad is located in southern Monterey County approximately 25 miles south of Salinas. Two California State Prisons are located within the City of Soledad, but are not served by the City's municipal water system. The City's potable water supply is entirely groundwater, from the Forebay Subarea of the Salinas Valley Groundwater Basin. The City owns and operates eight groundwater wells, only four of which are currently operational with a combined capacity of 6,618 AFY. Two of the wells are in the process of being decommissioned due to high rates of nitrates. Two more wells are planned for construction within the next three to five years. Since 2005, the City has completed construction of three new 1 MG storage tanks, storage booster pumps have been installed in low pressure zones of the system, and construction of a new water transmission main and pressure regulating valve has been completed. The City now has a total of four 1 MG tanks. Contaminants of local concern are pesticides and total dissolved solids (TDS). The water quality of the primary wells is good and meets all standards. As previously stated, two wells have elevated nitrate concentrations and some organic chemical contamination, and are in the process of being decommissioned.

The City of Soledad operates one wastewater treatment plant, which treats the wastewater from the Prison as well as the City. The City of Soledad very recently completed an upgrade of the City Plant which, in addition to increasing plant treatment capacity to 5.5 MGD with a disposal capacity of 4.3 MGD, also treats wastewater to meet waste discharge requirement effluent limits for recycled water use. In 2010, the City completed an upgrade of its water reclamation facility to meet tertiary treatment requirements. The City of Soledad recently received funds through Round 1 of Proposition 84 IRWM Implementation Grants to fund completion of design of a recycled water delivery system to both agricultural and recreational areas in and near the City, as well as fund research into the feasibility and conceptual design of providing treatment of the wastewater of the City's of Gonzales and Greenfield. The project will construct a recycled water pump station, and design and construct the final transmission pipes needed to connect the recycled water transmission mains already constructed to the new pump station. Completion of the project will enable delivery of recycled water to multiple landscape areas in the City currently being irrigated with potable water (City of Soledad 2010).

[26] LAFCO 2010b and personal communication with City of Greenfield Public Works staff (January 2012).

Marina Coast Water District

The Marina Coast Water District was formed in 1960 to provide potable water service to the community of Marina (MCWD 2011). MCWD's current service area in Central Marina encompasses 3.2 square miles. The MCWD also provides potable water delivery and wastewater conveyance services to the Ord Community. The Ord Community encompasses a 44 square mile area, of which about 20 square miles is designated for redevelopment, with the balance being parks and open space. In 2010, the MCWD delivered a total of approximately 3,970 AF of potable water to 30,480 customers, including 1,743 AF to 19,700 customers in the City of Marina and 2,226 AF to 10,760 customers in the Ord Community. The source of water supply for the MCWD is the Salinas Valley Groundwater Basin. MCWD owns and operates three water production wells in the Deep (900-Foot) Aquifer for the Central Marina service area, and three wells in the 400-Foot Aquifer for the Ord Community service area. MCWD is adding a new well in the Deep Aquifer. In August 2005, the Central Marina and Ord Community water systems were connected; integrated operations allow water to flow between the two systems to meet peak demands and improve overall services.

Significant water quality issues include seawater intrusion and groundwater contamination from land use activities on the former Fort Ord Army Base. The former Fort Ord was identified by the US EPA as a National Priority List federal Superfund site on the basis of groundwater contamination discovered on the installation in 1990. In 2001, trichloroethylene (TCE), a cleaning solvent, was detected by the Army in one of the three water supply wells at the former Fort Ord. MCWD continues to monitor the affected well, and all other wells, for TCE and other contaminants on a regular basis.

The Salinas Valley Groundwater Basin has been in an overdraft condition with seawater intrusion of about 8,900 AFY at its coastal margins. Historically, MCWD supplied its Marina service area with water from 11 wells screened in the 180-Foot and 400-Foot Aquifers. Between 1960 and 1992, some of those wells indicated varying degrees of seawater intrusion and were replaced, first moving from the 180-Foot aquifer to the 400-Foot aquifer, and later moving to the Deep Aquifer. MCWD is currently the only significant user of the Deep Aquifer. Recent studies for MCWRA indicate that the seawater intrusion front continues to migrate inland in the vicinity of Marina and the Ord Community. There is some concern that the Deep Aquifer may become affected by seawater intrusion. MCWD operates a monitoring well installed between Monterey Bay and the Marina production wells.

MCWD has senior water rights to recycled water from the MRWPCA treatment plant, though is not currently exercising them. MCWD also owns a desalination plant with a potential capacity of 300 AFY, although this plant is currently idle and would require plant upgrades before restarting. MCWD signed a developer agreement in 2006 that would obligate the District to re-operate the desalination plant if needed. At present, discussions are underway between MCWD, MCWRA, California American Water (which supplies water to the Monterey Peninsula region), and MRWPCA for a replacement to the proposed construction and operation of a major regional desalination facility. There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a combined 10 MGD of product water.

Pajaro/Sunny Mesa Community Services District

The Pajaro/Sunny Mesa Community Services District water system was formed and has been in operation since 1986. The District provides potable water services, fire flows, parks, streetlights, and sanitary sewer services to thousands of residents of North Monterey County. The District provides these services from the Pajaro River in the north, to Moss Landing in the west, to the Highway 101 corridor in the south. It is the only public agency that provides public potable water services in the Pajaro, Elkhorn, and Prunedale areas (Pajaro lies outside of the Greater Monterey County IRWM region, but the communities of Elkhorn, Prunedale, and Sunny Mesa are located within the region).[27]

The Pajaro/Sunny Mesa Community Services District lies within the Pajaro Groundwater Basin. Groundwater management and planning is governed by the Pajaro Valley Water Management Agency (PVWMA). The Community Services District owns and operates multiple water systems, including one serving Pajaro and another water system serving the Sunny Mesa area. The District owns and operates 23 wells, 1.8 million gallons of water storage, about 62,000 lineal feet of water mains. These facilities do not meet current needs of the District.[28]

Water Purveyors in the Big Sur Region
Water supply along the Big Sur coast is provided by many small mutual water companies. Among these are Coastlands Mutual Water Company, Rancho Chapparal, Clear Ridge, Garrapata Water Company and Buck Creek Water Company. Residents and businesses obtain their water from either private wells or springs.

Coastlands Mutual Water Company is the largest water supplier in the Big Sur coastal region, serving 40 connections.[29] Coastlands uses surface water for its water supply, drawing most of its supply from Post Creek (with spring boxes located above the Ventana Inn) and a smaller portion of its supply from Mule Creek (serving about 8 connections on that system). Surface water is captured in spring boxes, filtered and chlorinated and piped to each resident's property. Extra capacity is stored at each property owner's personal water storage facility as well as in a community 100,000-gallon storage tank on high ground adjacent to the subdivision.

Coastlands has recently begun monitoring water usage; for 2009, water usage averaged approximately 7,900 gal/day. The company owns two storage tanks (a 15,000-gallon tank and the 100,000-gallon community water tank, the latter of which was installed in 2003 to improve water supply reliability), pipelines, and a skid-mounted water filtration system. The company recently installed 4" pipelines from the 100,000-gallon tank to a particularly steep and isolated area to help with fire suppression. The water quality in Big Sur is generally of excellent quality; however, because Coastlands depends on surface water as its sole water source, turbidity is a significant problem, particularly following wildfire events. The Company is considering the possibility of drilling a well to address this problem.

B.4.2.c Flood Control Districts

As described above in Section B.3.3.e Floodwater and Flood Management, the agency with primary responsibility for flood control and floodplain management in Monterey County is the MCWRA. The MCWRA owns and operates the Nacimiento and San Antonio Dams, and is responsible for maintaining some portions of the Salinas Reclamation Ditch. Flood control also falls under the authority of municipalities throughout the region, which are responsible for storm drain maintenance and surface water disposal.

B.4.3 Service Areas of Land Use Agencies in the Region

Land use agencies in the region include the six incorporated cities noted above, plus the County of Monterey which is responsible for land use planning in the unincorporated areas of the county. In

[27] Source: Pajaro/Sunny Mesa Community Services District website: http://pajarosunnymesa.com/
[28] Source: Email communication with Pajaro/Sunny Mesa CSD General Manager (December 1, 2011).
[29] Source: Email communication with Coastlands President (December 1, 2011).

addition, the U.S. Forest Service makes land use decisions for the federal lands within the Los Padres National Forest, the Bureau of Land Management (BLM) is responsible for land use decisions on its land holdings (including lands in South Monterey County and about 15,000 acres of property on the former Fort Ord, designated for open space and habitat management uses), and California State Parks is responsible for land use planning in its six State Park units within the region. The U.S. Army is responsible for land use planning on Fort Hunter Liggett, Camp Roberts, and its residential holdings on the former Fort Ord. Various other federal and state agencies hold small properties throughout the County, which are outside local land use authority.

In addition, as stipulated in the Coastal Act, the California Coastal Commission (CCC) has authority to certify land use policy in the coastal zone. CCC retains land use authority in areas of original jurisdiction and for all work below the mean high tide level. In addition, CCC has limited appeal authority over the following coastal permit applications (Chapter 20.88 Capital Improvement Program):

- Approved projects between the sea and the first through public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tide line of the sea where there is no beach, whichever is the greater distance.
- Approved projects in county jurisdiction located on tidelands, submerged lands, public trust lands, within 100 feet of any wetland, estuary, or stream or within 300 feet of the top of the seaward face of any coastal bluff.
- Any approved project involving development that is permitted in the underlying zone as a conditional use. Uses listed as principal uses are not appealable to the CCC unless they fall within the above categories by location.
- Any project involving development that constitutes a major public works project or a major energy facility.

Pursuant to the California Coastal Act, Monterey County amended its General Plan in the 1980s to adopt a Local Coastal Program (LCP) made up of land use plans (policy) and coastal implementation plans (regulatory) that govern land use within the coastal zone. Monterey County's LCP consists of four planning areas including, within the Greater Monterey County IRWM region, North County and Big Sur Coast. Policies for development within these areas are established in land use plans that have been certified by the CCC.

B.4.4 Boundaries of Watersheds and Groundwater Basins

The watersheds and groundwater basins in the region are described in detail in the sections above. For a map illustrating the boundaries of the region's watersheds, please see Figure B-6 in Section B.3.1. For a map illustrating the boundaries of the region's groundwater basins, please see Figures B-11 and B-12 in Section B.3.3.b.

B.5 WATER SUPPLY AND DEMAND

Water for the Greater Monterey County IRWM region is supplied entirely from its own water supply sources, including groundwater and surface water supplies. No water is "imported" from outside the region's boundaries (except, as mentioned previously, for the water that flows via the Salinas River from San Luis Obispo County). Water use in the region is directly affected by land use and population, and will be increasingly impacted by climate change factors. The following sections describe historic land use, population, and water use trends in the region, and projected water demand over a 25-year planning horizon based on projected land use and population trends.

While the discussion of water supply and demand focuses mainly on water quantity, it assumes that the water is also of sufficient quality for its intended use. Thus, municipal water demand assumes water that will generally meet drinking water standards, agricultural water demand assumes a level of water quality suitable for irrigation purposes, and environmental water demand assumes certain water quality parameters, such as suitable water temperature and clarity needed to support aquatic and riparian species.

B.5.1 Population Trends

Table B-7 below shows population trends for cities and communities in the Greater Monterey County IRWM region since 1960.

Table B-7: Population of Cities and Selected Communities 1960 - 2010

	1960	1970	1980	1990	2000	2010
Big Sur Coastal Division	659	898	1,271	1,391	1,180	1,710
Castroville, CDP	2,838	3,235	4,396	5,272	6,724	6,481
Chualar, CDP	-	580	580	700	1,444	1,190
Elkhorn	-	-	-	1,458	1,591	1,565
Gonzales	2,138	2,575	2,891	4,660	7,525	8,187
Greenfield	1,680	2,608	4,181	7,464	12,583	16,330
King City	2,937	3,717	5,495	7,634	11,094	12,874
Las Lomas CDP	-	-	1,740	2,127	3,078	3,024
Marina	-	-	20,647	26,436	25,101	19,718
Prunedale CDP	-	-	-	7,393	16,432	17,560
Salinas	28,957	58,896	80,479	108,777	151,060	150,441
San Ardo, CDP	-	460	460	533	501	517
San Lucas, CDP	-	202	202	439	419	269
Soledad	2,837	4,222	5,928	7,146	11,263	25,738

Source: US Census Bureau (except for Chualar, San Ardo, and San Lucas 1970-1990 data: this data was taken from the Salinas Valley IRWM FEP but the original source is uncertain).

Population in the Big Sur area of the Greater Monterey County region has remained relatively stable over the past hundred years. In the Salinas Valley and North County areas, however, population has expanded considerably. Most of the urban development in the region has occurred in the cities of Salinas, Soledad, Gonzales, Greenfield, and King City. The greater Salinas area has experienced particularly rapid growth and development in recent years, with Salinas absorbing approximately 70 percent of Monterey County's growth within the last 20 years (from 1990 to 2010). This growth is occurring despite the fact that infrastructure and services are minimal outside of the incorporated communities with the majority of dwellings on individual wells and septic systems.[30]

Despite the general upward trend, growth has slowed considerably in the past decade compared to the previous decade due to the economic downturn. For example, the City of Gonzales experienced 61.5 percent growth from 1990-2000, and 8.8 percent growth from 2000-2010; the City of Greenfield experienced 68.6 percent growth from 1990-2000, and 29.8 percent growth from 2000-2010; and the City of Salinas actually experienced slightly negative growth in the past decade (-0.4 percent), whereas it had experienced 38.9 percent growth from 1990-2000. One exception is the City of Soledad, whose growth more than doubled in the past decade from 11,263 to 25,738 residents (128.5 percent).[31]

AMBAG calculates population projections for urban areas in the Counties of Monterey, San Benito, and Santa Cruz. Table B-8 shows projected populations for selected cities and communities in the Salinas

[30] This last statement is excerpted from LAFCO 2006a, however using US Census 1990 – 2010 data for a 20-year percentage.
[31] Based on US Census data.

Valley and North County areas, projected to the year 2035. Most of the data in this table is from the AMBAG 2008 Regional Forecast; projections for communities not included in the AMBAG Forecast have been estimated as noted below. Note that the cities and communities included in the table below have been chosen to exactly match the urban areas included in the MCWRA Groundwater Extraction Summary Reports (GWESR), in order to facilitate calculating "future water demand" for urban areas in the Salinas Valley (see Section B.5.4.a, Urban Water Use Projections, below). The population for "Other Areas" (which is different from "Unincorporated Monterey County") has been estimated "backwards" from the GWESR, rather than from a known existing population.

Table B-8: Population Projections for Cities and Communities in the Salinas Valley

	2010	**2020**	**2030**	**2035**	**Avg. Annual Growth:**
Castroville, CDP	6,481	7,200	8,500	9,000	1.6%
Chualar, CDP	1,190	1,236	1,234	1,239	0.2%
Gonzales	8,187	15,969	20,941	23,418	7.4%
Greenfield	16,330	21,855	27,348	30,337	3.4%
King City	12,874	17,269	22,482	24,726	3.7%
Marina Coast Water District (includes City of Marina and Ord Community)	32,184	57,718	69,887	75,887	5.4%
Other Areas	78,804	81,877	81,771	82,073	0.2%
Salinas	150,441	163,234	170,913	173,359	0.6%
San Ardo, CDP	517	537	536	538	0.2%
San Lucas, CDP	269	279	279	280	0.2%
Soledad (City and State Prisons)	25,738	33,760	38,801	41,405	2.4%
Unincorporated Monterey County	109,509	113,778	113,628	114,052	0.2%
Monterey County	*415,057*	*483,733*	*515,549*	*530,362*	*1.1%*

Sources: US Census 2010 data, plus AMBAG Monterey Bay Area 2008 Regional Forecast for 2020-2035 data, with exception of: Castroville population projections were estimated (as a "best guess") by Castroville Community Services District General Manager (email communication, December 5, 2011); Chualar 2020 projection from AMBAG as cited in LAFCO 2006 North County MSR; Chualar 2030-2035 and San Ardo and San Lucas 2020-2035 projections based on AMBAG projected growth rate for Unincorporated Monterey County. MCWD population estimates are from the MCWD 2010 Urban Water Management Plan. The 2010 population for "Other Areas" was calculated by dividing AF of water used in 2010 for "Other Areas" (11,735 AF) by the average per capita water use in years 2008-2010 (0.1489133, see Section B.5.4.a below); population for years 2020-2035 was then calculated according to Unincorporated Monterey County growth rate.

Continuous growth is expected in the cities of Gonzales, Greenfield, Salinas, King City, and Soledad, as reflected in their respective General Plans. Growth for many of the smaller communities, however, is expected to fluctuate over the years, with an average annual growth rate of about 0.2 percent over the next 20+ years.

B.5.2 Land Use Trends

The primary land use in Monterey County is agriculture, representing about 56 percent of the total land area and occupying more than 1.4 million acres of land. The second largest land use consists of public and quasi-public uses (such as parks, recreational, community, and military facilities), comprising about 23 percent of the total land area. About 16 percent of the land area in the county is devoted to resource conservation and other uses. The remaining 5 percent of the county has been developed with residential, industrial, and commercial uses. Another minor land use includes the exploitation of mineral and oil reserves, including oil drilling in the San Ardo area and several small "family-sized" gold mines in the Los Burros Mining District in the southern Santa Lucia Mountains in Big Sur (Monterey County Planning Department. 2010b, Section 4.1).

Historically there has been a strong military presence in Monterey County with Fort Ord located in the northern Salinas Valley along the coast, Fort Hunter Liggett located on the eastern side of the Santa Lucia Mountains, and Camp Roberts located at the southern end of the county. Recent base closures have resulted in a reduction in the military presence and reuse of the former Fort Ord (recently designated a National Monument, and is also the location of California State University Monterey Bay, plus new residential development and other facilities). Fort Hunter Liggett, encompassing 165,000 acres within the Santa Lucia Mountains, is owned by the United States Army and is used primarily as a training facility. Camp Roberts is also owned by the U.S. Army and while it is used by all branches of the armed forces, it is licensed to the California National Guard and is their largest training base, encompassing 43,000 acres.

In the Big Sur area, the predominant land uses are public recreation and private residential development. Cattle grazing occurs on several of the large private land holdings and on a few grazing allotments on public land. Approximately 65 percent of the Big Sur coastal region (a 234-square mile area, approximately 70 miles long and averaging 3.3 miles in width) is in public ownership held by the U.S. Forest Service (Los Padres National Forest), the State Department of Parks and Recreation, and the University of California (which owns Landels-Hill Big Creek Reserve, 3,848 acres). The California Department of Parks and Recreation operates six state parks in the Big Sur region: Garrapata State Park (2,879 acres), Andrew Molera State Park (4,766 acres), Pfeiffer Big Sur State Park (1,006 acres), Julia Pfeiffer Burns State Park (3,762 acres), Limekiln State Park (716 acres), and the Point Sur Historic Park. Approximately 1,200 private parcels exist in the Big Sur Land Use Area, including dozens of private in-holdings throughout the National Forest, which are only accessible by forest service roads.

Land use activities in Big Sur have changed considerably since its early European settlement. In the 1880s, subsistence ranching, logging of redwoods, harvesting of tan bark, and mining of limestone and gold supported a local population of nearly 1,000 people (Monterey County Planning Department 1981). The completion of Highway One in 1937 made the rugged and wild Big Sur coast far more accessible to the outside world, shifting patterns of interaction and use of the land. Today, single-family residences comprise the major land use on private land, occurring either in rural residential clusters or scattered along Highway One. Commercial uses, including restaurants, small grocery stores, and service stations are generally concentrated in the Big Sur Valley. Small visitor-serving commercial areas include Big Sur, Lucia, and Gorda. Recreational uses include public and private campgrounds, visitor accommodations, restaurants, State Park lands, and the Los Padres National Forest. The Big Sur Local Coastal Plan (LCP), which was certified in 1986, was intended to provide comprehensive policy guidance to balance the development needs of area property owners and the local community with resource protection and public recreation over time. As a result of the LCP, current land use trends are intended to remain largely unchanged over time (Diehl 2006).

While land use activities in Big Sur have remained relatively stable over the past 100 years, land use in the Salinas Valley has changed quite dramatically. Table B-9 below shows agricultural and urban land use trends over the past 40 years for the Greater Monterey County IRWM region, based on DWR Land Use Surveys.[32] The table shows a steady increase in both urban and irrigated agricultural acreage over the

[32] DWR land use surveys are typically performed every seven years and consist of aerial surveys followed by field verification. The reason for the discrepancies in the Region's total land area from year to year is unclear. The geographic area covered in Table B-8 includes the following DWR Data Analysis Units (DAUs): Pressure (048), East Side (049), Forebay (050), Upper Valley (051), Monterey Peninsula (052), Arroyo Seco North (053), Gabilan Ranges (054), Lockwood (055), Santa Lucia Range (057), and Bolsa Nueva (058). The boundaries of these DAUs align almost perfectly with the boundaries of the Greater Monterey County IRWM region, with the exception of DAU 052 (approximately 44% of the land area lies within the Monterey Peninsula, Carmel Bay, and South Monterey Bay IRWM Region), DAU 057 (approximately 5% lies within the Monterey Peninsula IRWM Region), and DAU 053 (less than 1% lies within the Monterey Peninsula IRWM Region). For the purposes of determining land use, 100% of the acreages in DAUs 057 and 053 have been included as part of the Greater Monterey County

years, occurring mainly in the Salinas Valley and North County. Urban acreage grew about 33,225 acres from 1968 to 2005 (nearly tripling), while irrigated agricultural acreage grew about 45,427 acres over that time period. As irrigated agriculture and urban populations have expanded, so have the water needs of the region. Note that although several thousand acres of agricultural land have been converted to urban uses, land continues to be brought into agricultural production (Monterey County Planning Department 2010b). This is reflected in the considerable decline in native vegetation (about 80,000 acres) since 1968.

Table B-9: Land Use in the Greater Monterey County IRWM Region

Land Use Type	1968	1976	1982	1989	1997	2005
Irrigated Ag	175,173	209,669	210,546	207,580	219,114	220,600
Non-irrigated Ag	17,033	49,098	58,361	32,944	30,534	14,532
Total Agricultural Acreage	192,206	258,767	268,907	240,524	249,648	235,132
Semi-Agricultural Acreage	1,221	2,389	2,832	3,621	3,214	2,945
Urban Acreage	18,508	25,127	28,224	39,114	49,300	51,733
Native Vegetation	1,698,324	1,624,238	1,611,160	1,625,996	1,600,527	1,618,718
Total Acres	1,910,259	1,910,521	1,911,123	1,909,255	1,902,689	1,908,528

Source: DWR Land Use Surveys. Semi-agricultural acreage includes farmsteads, dairies, livestock feed lots, and poultry farms.

Agriculture in the Salinas Valley is quite different from what it was 150 years ago. Cattle ranching and grain were the primary agricultural activities in the 1850s. As shipping became increasingly available (beginning in 1866 with construction of a major shipping terminal in Moss Landing) and water became increasingly accessible (beginning with gravity-fed irrigation systems, and advancing to wells driven by steam and wind power pumps, and then by gas and electric pumps), farmers shifted from grain to more water intensive crops such as sugar beets, and then to more lucrative crops such as lettuce.

Agricultural trends for selected crop categories (field crops, vegetables, and fruits/nuts) and for some selected crops (sugar beets, lettuce, broccoli, wine grapes, and strawberries) are shown on Table B-10 and illustrated by Figures B-15 and B-16 below, based on Monterey County Agricultural Commissioner Crop Reports from 1930 – 2010.

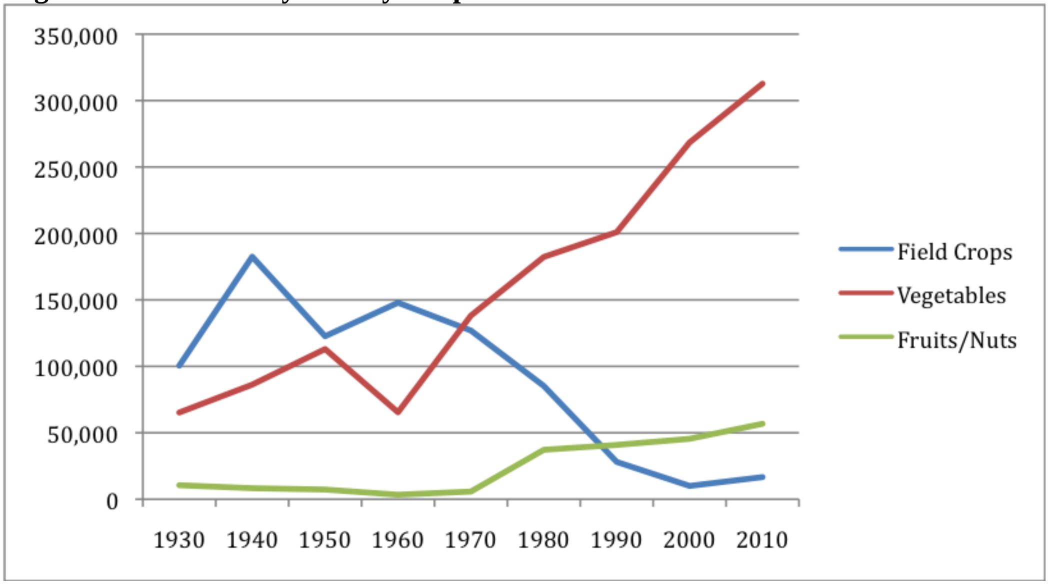
Table B-10: Acreage Trends for Selected Crop Categories in Monterey County 1930 – 2010

	1930	1940	1950	1960	1970	1980	1990	2000	2010
Field Crops	100,540	182,518	122,660	147,894	126,945	85,223	28,080	10,015	16,654
Sugar Beets	250	21,356	23,617	20,200	14,305	11,385	2,740	0	0
Vegetables	65,250	86,235	113,009	65,423	138,164	182,330	200,967	268,489	312,691
Lettuce	50,000	48,202	59,717	51,421	55,473	67,684	78,811	115,088	140,000
Broccoli	0	1,735	6,580	0	23,700	43,395	48,700	61,500	60,926
Fruits/Nuts	10,550	8,294	7,285	3,369	5,778	37,200	40,864	45,458	56,768
Grapes	400	116	0	0	0	33,724	33,154	36,265	43,321
Strawberries	250	148	506	0	2,600	2,785	5,830	6,990	10,664

Source: Monterey County Agricultural Commissioner Crop Reports 1930 - 2010. "Field crops" does not include rangeland (previously called "pasture/dry land" in the Crop Reports).

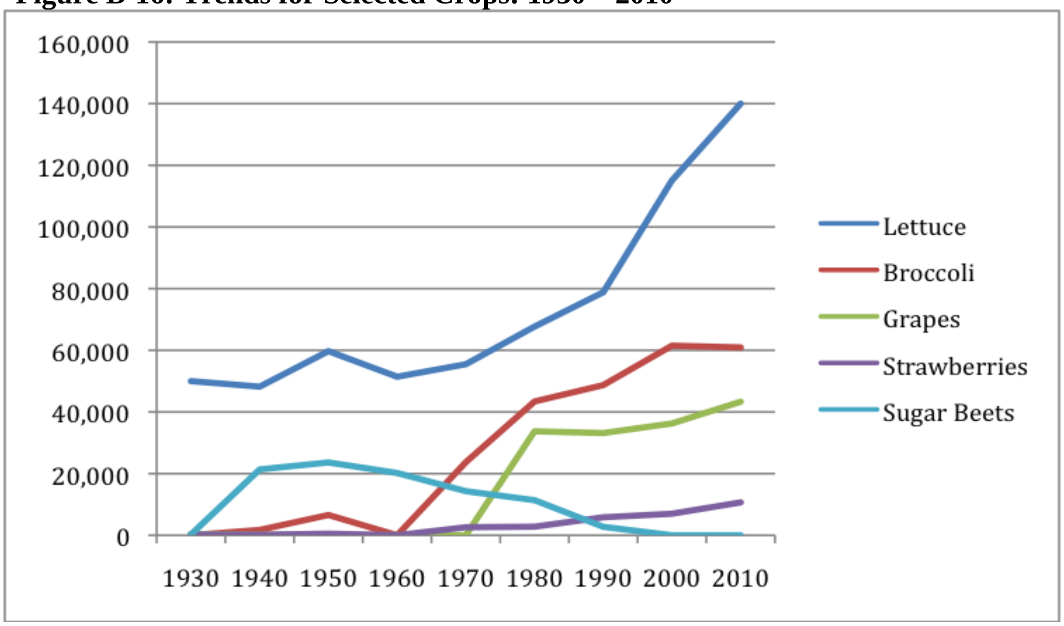
Region, and the land use acreages in DAU 052 included as part of the Greater Monterey County Region (about 56%) were estimated based on 2010 Google Maps.

Figure B-15: Monterey County Crop Trends: 1930 – 2010



Source: Monterey County Crop Reports

Figure B-16: Trends for Selected Crops: 1930 – 2010



Source: Monterey County Crop Reports

Of particular importance historically were the disappearance of sugar beets and a decline in field crops production, corresponding with the steep increase in truck crops. These changes demonstrate the dynamics of crop production in the Salinas Valley and depict a pattern towards more lucrative—and generally more water intensive—crops such as lettuce, broccoli, artichokes, and strawberries. The increase in the fruits/nuts category since 1970 is due mainly to heightened production of wine grapes and strawberries. While the strawberry acreage appears modest relative to other crops such as lettuce, the strawberry value in 2009 became for the first time the county's number one crop, surpassing leaf lettuce and in 2010, grossing $751 million in revenues (with leaf lettuce grossing $725 million in 2010).

Agriculture is expected to remain the predominant land use in the Salinas Valley well into the future. Although agricultural land use in the Salinas Valley is not expected to change dramatically over the next 25 years, the pressure to convert agricultural land to urban land will intensify as the population in the Salinas Valley continues to grow. In the North County area, agriculture will likely remain the predominant land use in areas with good soils; however, in steeply sloped areas, rural residential will likely become the predominant land use. Note that "urban development" in North County is quite different than in the Salinas area. In North County, 1-5 acres rural residential is the typical mode, so even the "developed" areas are much less dense than around Salinas.[33]

B.5.3 Water Use Trends

Water use information in the Big Sur coastal area has not been systematically tracked, and therefore historic water use trends cannot be assessed. Water suppliers in the Big Sur region report that water supply is not a problem for the area; any water management issues, when they occur, have more to do with infrastructure limitations such as inadequate filtration or insufficient storage capacity. This section will therefore focus entirely on water use trends in the Salinas Valley and North County (i.e., water use from the Salinas Valley Groundwater Basin).

Water use information in the Salinas Valley has been systematically tracked only since the early 1990s; however, MCWRA has estimated historic (1970-1994) agricultural and urban water use with the help of a modeling tool called the Salinas Valley Integrated Ground and Surface Water Model (SVIGSM). The SVIGSM is a sophisticated modeling tool developed for analysis of hydrologic conditions in the Salinas Valley. The SVIGSM was calibrated to be utilized as a planning level analytical tool, and since then it has been applied to a number of projects, including CSIP and the Salinas Valley Water Project (SVWP).

Table B-11 below shows 25 years of historic water use in the Salinas Valley as estimated by SVIGSM; it was modeled based upon historic agricultural land use and cropping pattern analysis between 1970 and 1994 (MCWRA 1997a). While urban water use shows a steady increase over the 25-year period, agricultural water use shows a slightly declining trend (though there is less of a discernable pattern for agricultural use).

Table B-11: Estimated Water Use 1970-1994 in the Salinas Valley, Utilizing the Salinas Valley Integrated Ground and Surface Water Model

Year	Agricultural Pumping (AF)	Urban Pumping (AF)	Total Groundwater Pumping (AF)
1970	564,298	17,127	581,425
1971	568,064	17,619	585,683
1972	611,384	18,231	629,535
1973	545,882	18,845	564,725
1974	500,875	19,457	520,332
1975	524,948	20,072	545,020
1976	500,261	20,681	520,942
1977	563,798	21,465	585,150
1978	503,630	21,941	525,559
1979	566,337	22,508	588,845
1980	475,635	23,118	498,753
1981	491,257	23,868	515,092
1982	415,170	24,654	439,826

[33] Information about North County from Bryan Largay, Elkhorn Slough National Estuarine Research Reserve, November 2010 email communication with IRWM Plan Coordinator.

1983	422,071	25,139	447,214
1984	513,759	25,557	539,319
1985	487,486	25,966	513,456
1986	453,867	26,381	480,328
1987	495,354	26,790	522,349
1988	481,758	27,202	509,166
1989	465,537	26,255	491,907
1990	426,615	28,029	454,789
1991	454,862	29,890	484,977
1992	453,027	32,086	485,235
1993	435,698	34,283	470,190
1994	449,015	36,478	485,691
Average	**494,824**	**24,546**	**519,420**

Source: MCWRA 1997a

In February of 1993, the Monterey County Board of Supervisors adopted Ordinance No. 3663 that required water suppliers in the Agency’s Zones 2, 2A and 2B to report water use information for groundwater extraction facilities and service connections. That ordinance was replaced in October 1993 by Ordinance No. 3717, which modified certain requirements in the previous ordinance but kept the groundwater extraction reporting requirements in place for wells with a discharge pipe with an inside diameter of at least three inches.

MCWRA began collecting groundwater extraction data from well operators for agricultural and urban water uses in 1992. Agricultural water use consists of water used for irrigation, while urban water use includes all household consumption as well as commercial and industrial water use. Because agriculture is the main economic activity in the Salinas Valley, commercial and industrial water use is relatively low and therefore considered to be a function of the population. The groundwater extraction data, provided by over 300 well operators, is compiled in the Ground Water Extraction Management System portion of MCWRA Information Management System, a relational database maintained by the MCWRA, and summarized in annual Ground Water Extraction Summary Reports (GWESR). Since 1991, MCWRA has also required the annual submittal of Agricultural Water Conservation Plans, which outline the best management practices (BMPs) that are adopted each year by growers in the Salinas Valley. In 1996, another ordinance was passed that required the filing of Urban Water Conservation Plans. This program provides an overview of per capita water use and BMPs being implemented by urban water users as conservation measures.

Table B-12 below summarizes the GWESR data from 1995 to 2010. The agricultural data cover reporting from November 1 (previous year) through October 31 of the reporting year (the “water year”); the urban data cover the calendar year of the reporting year. Note that reported data provided by the water purveyors is not 100 percent accurate; reporting has varied over the years from 82 percent to 98 percent, and therefore the water use reflected in the table below is lower than actual use. In addition, data is submitted by individual reporting parties and is not verified by MCWRA staff. Note that a second source of agricultural water use not reflected in this table currently includes 13,300 AFY of tertiary treated recycled water from the MRWPCA plant, delivered to approximately 12,000 acres of agricultural users near Castroville.

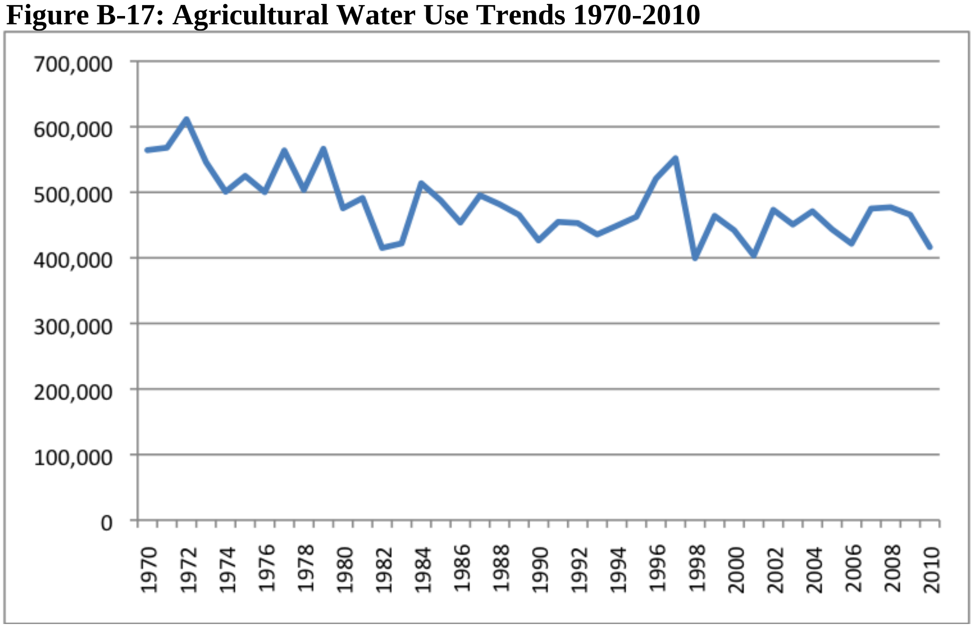
Table B-12: Agricultural and Urban Water Use in the Salinas Valley 1995-2010

Year	% Reported	Agricultural Pumping (AFY)	Urban Pumping Reported (AFY)	Total Pumping (AFY)
1995	98%	462,628	41,884	504,512
1996	96%	520,804	42,634	563,438
1997	93%	551,900	46,238	598,138
1998	93%	399,521	41,527	441,048
1999	91%	464,008	40,559	504,567
2000	89%	442,061	42,293	484,354
2001	82%	403,583	37,693	441,276
2002	93%	473,246	46,956	520,202
2003	97%	450,864	50,472	501,336
2004	97%	471,052	53,062	524,114
2005	98%	443,567	50,479	494,046
2006	96%	421,634	49,606	471,240
2007	97%	475,155	50,440	525,595
2008	97%	477,124	50,047	527,171
2009	97%	465,707	45,517	511,224
2010	97%	416,421	44,022	460,443

Source: MCWRA GWESR from website: http://www.mcwra.co.monterey.ca.us/.
Note: The extraction amounts reflected in this table are lower than actual extraction amounts, since reporting was less than 100% in each reporting year (as shown).

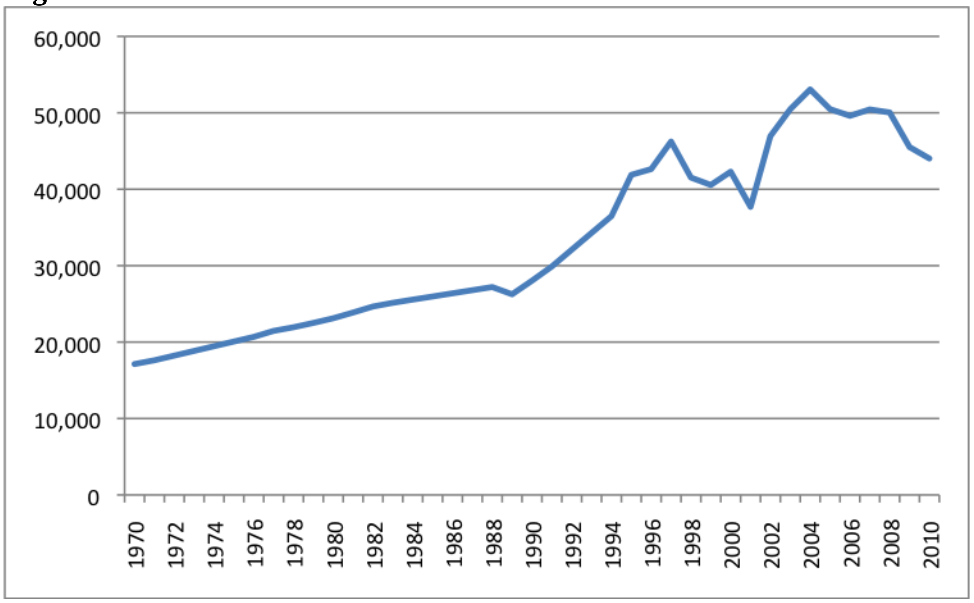
Figures B-17, B-18, and B-19 below illustrate agricultural and urban water use trends from 1970-2010 using the combined data from SVIGSM and GWESR. Agricultural pumping accounts for about 90 percent of groundwater extraction in the Salinas Valley Groundwater Basin. While urban pumping accounts for a relatively small proportion of groundwater extraction, note that urban use has been slowly increasing relative to agricultural water use over the years. According to SVIGSM estimates, agricultural pumping accounted for approximately 97 percent of groundwater extraction in the mid-1970s and for approximately 93 percent in the mid-1990s, and according to GWESR data, has accounted for approximately 90 percent of groundwater extraction in recent years, with urban pumping accounting for the remaining 10 percent.

Figure B-17: Agricultural Water Use Trends 1970-2010



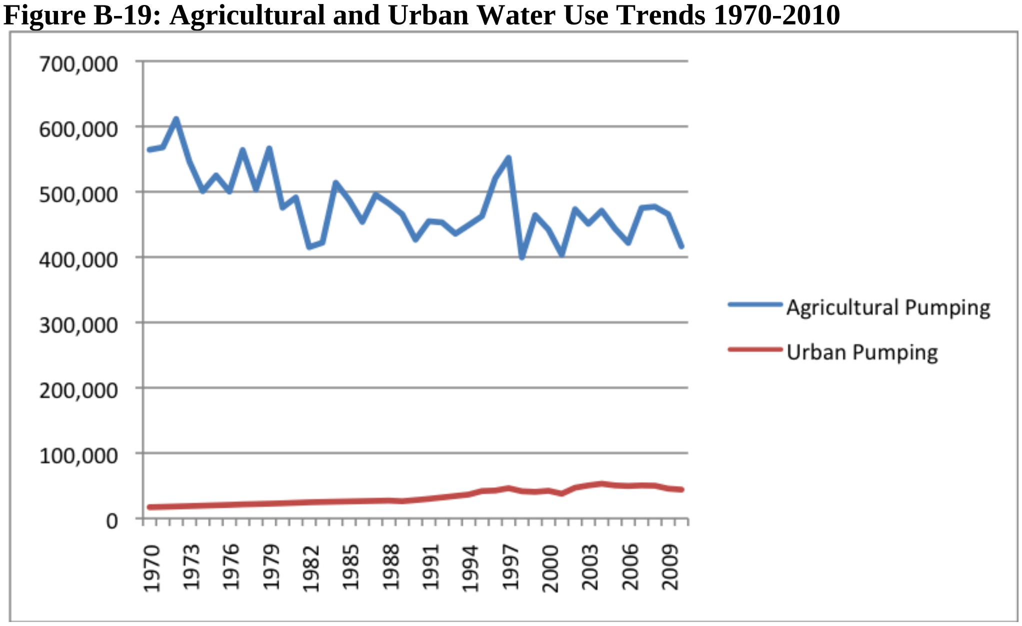
Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

Figure B-18: Urban Water Use Trends 1970-2010



Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

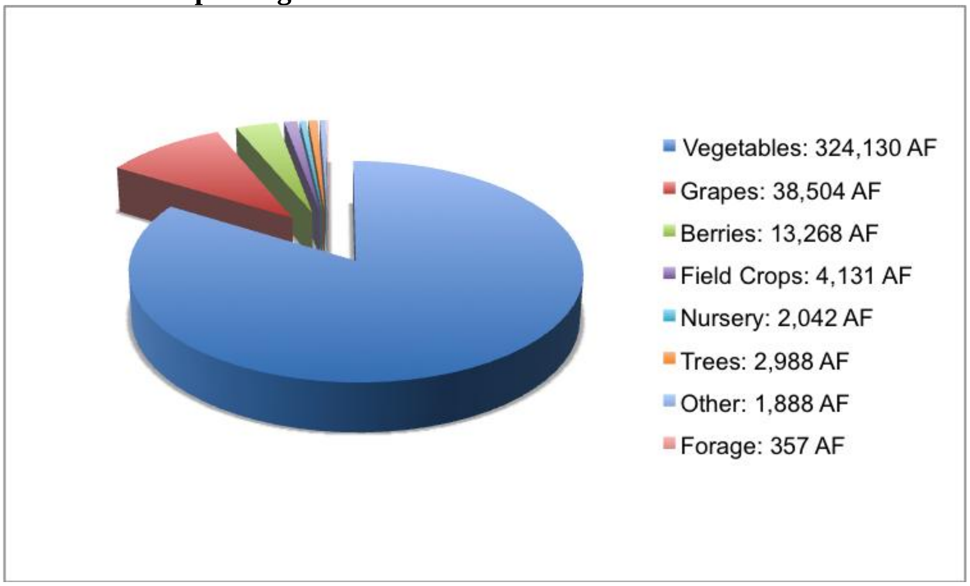
Figure B-19: Agricultural and Urban Water Use Trends 1970-2010



Source: SVIGSM for 1970-1994; GWESR for 1995-2010 (raw data, with less than 100% reporting)

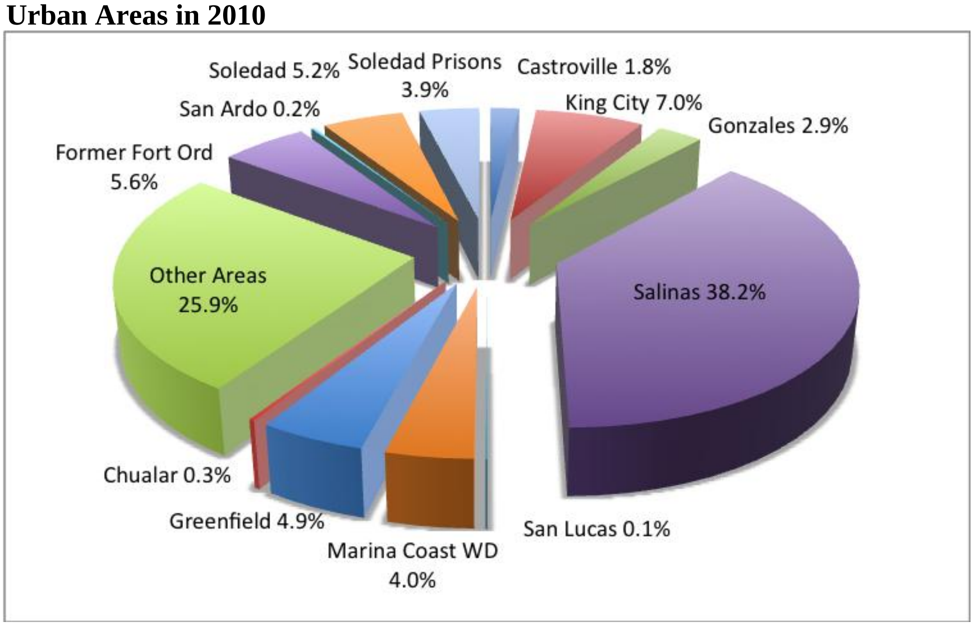
The two figures below provide more detail for both agricultural and urban water use for the most recently reported year (calendar year for urban data, water year for agricultural data). Figure B-20 below illustrates the relative amounts of water used for different crop categories in the Salinas Valley in 2010. Note that 324,130 AF of water was extracted from the Salinas Valley Groundwater Basin to irrigate vegetables, totaling 84 percent of the total agricultural pumping. Groundwater extracted for grapes totaled 38,504 AF, or 10 percent of the total agricultural pumping. These data are based on 97 percent reporting of the 1,846 wells in the Salinas Valley for the 2010 reporting year. Figure B-21 shows relative groundwater extraction amounts attributed to urban (residential, commercial/institutional, industrial, and governmental) pumping for 2010 in the Salinas Valley.

Figure B-20: Acre-feet of Salinas Valley Groundwater Basin Water applied to Selected Crop Categories in 2010



Source: MCWRA 2010 GWESR

Figure B-21: Distribution of Salinas Valley Groundwater Extraction for Urban Areas in 2010



Source: MCWRA 2010 GWESR

B.5.4 Future Water Demand

In the Big Sur coastal region, population and land use trends are expected to remain relatively constant over the next 20+ years, due to the fairly restrictive land use policies in the Local Coastal Plan. As a result, water demand is also expected to remain relatively stable over the 20-year planning horizon. As noted above, currently there is no shortage of water in the Big Sur coastal region; water supply problems, when they occur, have more to do with infrastructure limitations such as inadequate filtration or insufficient storage capacity. Environmental water needs may change over time with climate change, but the extent and nature of those impacts are still unclear. For the purposes of IRWM planning, therefore, water demand/supply is expected to remain relatively stable (and essentially non-problematic) over the next 20+ years in the Big Sur coastal region.

The remainder of this section will focus entirely on the Salinas Valley and North County areas of the Greater Monterey County IRWM region, i.e., the areas that depend solely on the Salinas Valley Groundwater Basin for water supply. Future water demand can be estimated based on projected urban water uses (including industrial uses) and agricultural water uses, plus environmental water needs. The following sections describe each of these in turn for the Salinas Valley and North Coast areas of the Greater Monterey County IRWM region.

B.5.4.a Urban Water Use Projections

Three different methods for projecting urban water use over the next 20 years are considered and compared for the purposes of this IRWM Plan. Each method is valid, and results are broadly consistent though differences do exist. For planning purposes, the most conservative estimate will be used. This section describes each of these three methods.

First Method: MCWRA GWESR and AMBAG Population Projections
The first method utilizes the GWESR data, US Census population data, and AMBAG population projections for urban areas in the Salinas Valley (see Table B-8 in Section B.5.1 above for population projections for the years 2020-2035). Note that "urban water use" in GWESR includes water used for residential, commercial/institutional, industrial, and governmental uses (including city landscaping).

In order to calculate future water demand using this first method, an average urban water use estimate was determined for the year 2010 by averaging urban water use from 2008-2010 (to account for variability within any one year) for selected cities and communities within the Salinas Valley (locations were chosen based on availability of 2010 US Census data). Next, an average per capita water use was determined based on US Census year 2010 population, as follows:

Table B-13: Determining Average Per Capita Water Use

	Average GW Use (AF) from 2008-2010	Population	Average Per Capita Water Use (AF)
Castroville	792	6,481	0.122203364
King City	2,926	12,874	0.227305681
Gonzales	1,422	8,187	0.173649281
Salinas	19,833	150441	0.131834628
San Lucas	40	269	0.149938042
Greenfield	2,335	16,330	0.142967953
San Ardo	117	517	0.226305609
Soledad City	2,419	14,538	0.166391526
Soledad Prisons	2,015	11,200	0.179880952
TOTAL	31,899	**220,837**	**0.144445904**

Sources: US 2010 Census and MCWRA 2008-2010 GWESR. In all three reporting years, MCWRA received data for 97% of wells; consequently, the water use amounts reflected in this table will be somewhat lower than actual water use.

Finally, per capita water use was multiplied by the projected populations for each city for the years 2020, 2030, and 2035 to determine future urban water demand in the Salinas Valley. For communities not included in the table above, the average per capita water use rate of 0.144446 was used. Table B-14 illustrates future urban water demand using this method.

Table B-14: Future Water Demand (AFY) for Urban Areas in Salinas Valley, Calculated from MCWRA GWESR and Population Projections

	Urban Water Demand (AFY)			
	2010 (actual data)	2020	2030	2035
Castroville, CDP	810	880	1,039	1,100
Chualar, CDP	121	179	178	179
Gonzales	1,282	2,773	3,636	4,067
Greenfield	2,152	3,125	3,910	4,337
King City	3,089	3,925	5,110	5,620
Marina Coast Water District (Marina + Ord Community)	4,234	8,337	10,095	10,962
Other Areas	11,383	11,827	11,811	11,855
Salinas	16,819	21,520	22,532	22,855
San Ardo, CDP	100	122	121	122
San Lucas, CDP	36	42	42	42
Soledad City	2,293	3,754	4,593	5,026
Soledad State Prisons	1,702	2,015	2,015	2,015
Total Urban Areas	**44,022**	**58,497**	**65,083**	**68,179**

Sources: 2010 data reflects actual urban water use from the 2010 MCWRA GWESR, with 97% reporting. 2020-2035 estimates are based on: MCWRA GWESR 2008-2010 (averaged raw data, with 97% reporting in each reporting year) and AMBAG population projections for Salinas Valley cities, 2020-2035 (with exceptions as noted in Table B-8, Population Projections for Cities and Communities in the Salinas Valley). Future water demand for "Other Areas" has been calculated by first estimating population (see above), then multiplying by average per capita water use.

Second Method: Data Reported by Water Purveyors

A second method for estimating future water demand for urban areas in the Salinas Valley is based on data reported by the water purveyors. The sources for these data are varied, and include Urban Water Management Plans (UWMPs), personal communications with water managers, and a 2005 survey administered to water purveyors.[34] For urban areas that are too small to have a UWMP, the future water demands were estimated using the methodology described above (i.e., using GWESR and population projections). Table B-15 below presents the current and future water demand identified for each urban area of the Salinas Valley using this second method.

[34] RMC Water and Environment Survey conducted in October 2005.

Table B-15: Future Water Demand for Urban Areas in Salinas Valley, Based on Information Provided by Water Purveyors

Urban Water Purveyors	Urban Water Demand (AFY)			
	2010	2020	2030	2035
Castroville – Castroville Community Services District [a]	813	1,200	1,600	1,800
Chualar – CalAm [b]	121	179	178	179
Gonzales – City of Gonzales [c]	1,867	3,112	4,800	
Greenfield – City of Greenfield [d]	3,398	5,666	6,800	
King City – California Water Service [e]	1,724	1,985	2,448	2,721
Marina Coast Water District – City of Marina [f]	1,962	3,181	4,044	
Marina Coast Water District – Ord Community [f]	2,592	6,715	8,172	
Other Areas[b]	11,383	11,827	11,811	11,855
Salinas – California Water Service (70% Salinas population plus outlying areas) [g]	16,940	19,840	22,504	23,984
Salinas – Alco (30% Salinas population) [h]	4,240	8,307	10,550	
San Ardo – San Ardo California Water District [b]	100	122	121	122
San Lucas – San Lucas County Water District [b]	36	42	42	42
Soledad – City of Soledad [i]	2,355	3,281	4,212	
Soledad State Prisons – California State Prisons [j]	1,702	1,702	1,702	1,702
Total Urban Areas	**49,233**	**67,159**	**78,984**	(incomplete data)

Sources:

a) Estimated by CCSD General Manager (email communication with IRWM Plan Coordinator, December 5, 2011)
b) Calculated according to GWESR and population projections (as described in Method One, above).
c) October 2005 RMC Water and Environment Survey
d) 2008 City of Greenfield UWMP
e) 2010 King City UWMP (California Water Service Company)
f) 2010 Marina Coast UWMP
g) 2010 Salinas District UWMP (California Water Service Company), accounting for SBx7-7 (20x2020) urban water conservation targets
h) Estimated by Alco for years 2010 and 2020 (email communication with Alco President, December 13, 2011); year 2030 was estimated based on Alco 2025 and 2027 urban water projection trends (adding 5% to the 2027 projection).
i) 2010 City of Soledad UWMP
j) 2010 GWESR: Actual 2010 Soledad State Prison ground water usage, and assuming stable prison population 2020-2035.

Third Method: Salinas Valley Integrated Ground and Surface Water Model

The third method for assessing urban water demand in Salinas Valley utilizes the SVIGSM. In 1997, MCWRA published the Salinas Valley Water Project Report, which utilized the SVIGSM to estimate current (1995 conditions) and future (2030) water demands. This method shows a projected urban water use increase from 45,000 AFY in 1995 to 85,000 AFY in 2030 (a 90 percent increase).

Urban Water Use Projections: Comparison of the Three Methods

Table B-16 below compares the results of the three methods used to estimate future urban water use. The results differ but are not entirely inconsistent. All three methods are valid, but for the purposes of IRWM planning, the most conservative water use estimate—resulting from the SVIGSM method—will be used.

Table B-16: Comparison of Urban Water Use Projection Methods

	Urban Water Use in the Salinas Valley (AFY)					
Method	**1995**	**2000**	**2010**	**2020**	**2030**	**2035**
1. Ground Water Extraction Summary Reports and Population Projections	41,884 (with 98% reporting)	42,293 (with 89% reporting)	44,022 (with 97% reporting)	58,497	65,083	68,179
2. Reports from Purveyors			49,233	67,159	78,984	
3. SVIGSM Method	45,000				85,000	

B.5.4.b Agricultural Water Use Projections

Conclusions about future agricultural water use could not be drawn based on analysis of historical (1970-2010) agricultural water use data from GWESR, as the data suggests no significant trend. Therefore, the SVIGSM, taking into account projected land use changes, will be used to estimate future agricultural water demand for the Salinas Valley. As noted earlier, agriculture is expected to remain the predominant land use in the Salinas Valley well into the future, though the pressure to convert agricultural land to urban will intensify as the population in the Salinas Valley continues to grow. The SVIGSM predicts that agricultural needs, which make up a far greater share of water use, will decrease by approximately 60,000 AFY from the year 1995 to the year 2030, a 13 percent reduction. This predicion was based on several assumptions, including increased irrigation efficiencies, changes from high to low water demand crops, and a slight reduction in agricultural land use resulting from conversion to urban uses.

Table B-17: Agricultural Water Demand Based on SVIGSM Modeling

Basin Groundwater Pumping	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Agricultural Water Use	418,000	358,000

Source: MCWRA 1998.

B.5.4.c Environmental Water Needs

Ecological and environmental water needs must also be taken into consideration when considering future water supplies for the region. Unfortunately, environmental water needs are not well quantified for the Greater Monterey County IRWM planning region. The lack of numerical data for environmental water needs—and the preponderance of data for urban and agricultural water needs—suggests that environmental water needs may be getting overlooked in water resource planning. Addressing environmental water needs will become more and more critical as ecosystems become increasingly vulnerable to the impacts of climate change. It is the intention of the RWMG to provide quantified data for environmental water needs in future updates of this IRWM Plan. In the meantime, the following section describes the types of environmental water uses in the region that will be most significant in the planning context.

All plant and animal species, terrestrial and aquatic, depend on water for their survival, but the consideration of “environmental water needs” in water resource planning tends to focus on in-stream and riparian water needs to support special status or other significant species, such as steelhead trout. It may also focus on adequate delivery of water to support the healthy functioning of important ecosystems such as floodplains, wetlands, and coastal waters. At present, environmental water needs are considered more often in the context of a regulatory or permitting process rather than as a component of planning.

The restoration of adequate in-stream flows, as well as the floodplain functions that depend on flow, is the statewide priority for the CDFG. The CDFG has developed Streamflow Recommendations (minimum flows) for rivers and streams throughout the state to assure the continued viability of their fish and wildlife resources. The CDFG has also developed a list of 22 other streams regarded by State and Federal fish and wildlife agencies as high priority for future in-stream flow studies. The only river on that list located within the Greater Monterey County region is the Big Sur River (ranked #5 out of 22). Objectives for the major rivers, estuaries, and wetlands of northern and central California are tabulated in Chapter 5 of the California Water Plan Update 2009, along with the amount of water needed to meet each of them (DWR 2009a, vol. 1, p. 4-16).

Environmental water needs include not only adequate water supply but adequate water quality suitable to the needs of the “water user” (e.g., cool in-stream water temperatures for steelhead). In the Greater

Monterey County IRWM region, environmental water needs will need to be identified primarily for:

- Rivers and streams that provide habitat, or potential habitat, for steelhead and other special status aquatic species. Within the Greater Monterey County IRWM region, critical habitat has been designated for South-Central California Coast steelhead along the entire Big Sur coast, including Big Sur River, Little Sur River, San Carpoforo and Arroyo de la Cruz Creeks, and within the Salinas River basin, which includes the Salinas River, the Salinas River Lagoon, Gabilan Creek, Arroyo Seco River, Nacimiento River, the San Antonio River, and their tributaries.
- Significant wetlands and estuaries such as Elkhorn Slough and Tembladero Slough; and
- Protected coastal waters such as the federally protected MBNMS, which encompasses four Critical Coastal Areas (CCA), two Areas of Special Biological Significance (ASBS), and five Marine Protected Areas (MPA).[35] One of the main environmental water uses in the region, according to DWR, is for the 366-acre Salinas River National Wildlife Refuge, where the Salinas River empties into Monterey Bay (DWR 2005, as cited in Monterey County Planning Department 2010b, p. 4.3-5).

B.5.4.d Future Water Demand: Conclusions

The projected water demands for water supply from the Salinas Valley Groundwater Basin are summarized in Table B-18 below. Water demand estimates of the Salinas Valley are based on the SVIGSM model for both urban and agricultural uses, with environmental water needs currently unknown. The SVIGSM model predicts an overall decrease in water use on the order of 20,000 AFY from 1995 to the year 2030. While agricultural water use is expected to decrease by about 60,000 AFY over this time period, urban use is expected to increase by about 40,000 AFY.

Table B-18: Future Water Demand

Water Use	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Urban	45,000	85,000
Agricultural	418,000	358,000
Environmental	unknown	unknown
Total Demand	**463,000+**	**443,000+**

Source: SVIGSM

B.5.5 Future Water Supply

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and in extensive seawater intrusion. Despite the overall future reduction in total basin water use predicted by the SVIGSM, the current groundwater problems in the basin are projected to continue into the future. Table B-19 below shows SVIGSM estimates for Salinas Valley Groundwater Basin overdraft, seawater intrusion, and Salinas River outflow to the ocean for the year 2030. Though basin overdraft is predicted to decrease 3,000 AF by the year 2030, overdraft will nonetheless continue to be a problem for the Salinas Valley basin (estimated at 14,000 AFY in 2030). In addition, seawater intrusion will continue to worsen (from 8,900 AF in 1995 to 10,300 AF in 2030). A strategy is clearly needed to offset groundwater pumping in order to meet the objective of achieving hydrologic balance within the Salinas Valley Groundwater Basin.

[35] Protected areas include: Elkhorn Slough (CCA and MPA), Moro Cojo Estuary (MPA), Old Salinas River Estuary (CCA), Salinas River (CCA), Julia Pfeiffer Burns Underwater Park (CCA and ASBS), Point Lobos (MPA), Point Sur (MPA), Big Creek (MPA), and the ocean area surrounding the mouth of Salmon Creek (ASBS).

Table B-19: Basin Overdraft, Seawater Intrusion, and Salinas River Outflow for the Salinas Valley

	Baseline or Existing (1995) Conditions (AFY)	Projected Future Baseline (2030) Conditions (AFY)
Basin Overdraft (does not include seawater intrusion)	17,000	14,000
Seawater Intrusion	8,900	10,300
Salinas River Outflow to Ocean	238,000	249,000

Source: MCWRA 1998. Note: Both conditions assume that deliveries from the Monterey County Water Recycling Project are being made, with 13,300 AY delivered for 1995 conditions and 15,900 AFY delivered under 2030 conditions. Basin overdraft is defined as the average annual rate of groundwater extraction over and above the total recharge to the groundwater basin. Seawater intrusion is defined as the average annual rate of subsurface flow from the Monterey Bay into the groundwater aquifers. All numbers shown assume that the Salinas Valley Water Project is not in place.

B.5.5.a Locally Proposed Solutions to Local Water Supply Issues

The RWMG is promoting a mix of resource management strategies to help achieve and maintain hydrologic balance in the Salinas Valley Groundwater Basin. Goals and objectives in this IRWM Plan encourage projects that will improve water supply reliability and protect groundwater and surface water supplies. Objectives include:

- Increase groundwater recharge and protect groundwater recharge areas.
- Optimize the use of groundwater storage with infrastructure enhancements and improved operational techniques.
- Increase and optimize water storage and conveyance capacity through construction, repair, replacement, and augmentation of infrastructure.
- Diversify water supply sources, including but not limited to the use of recycled water.
- Maximize water conservation programs.
- Capture and manage stormwater runoff.
- Optimize conjunctive use where appropriate.
- Promote projects to prevent seawater intrusion.

Several projects proposed in this IRWM Plan are intended to address these water supply objectives. Projects include, for example: the Granite Ridge Regional Water Supply Project, a project being proposed by the MCWRA to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County; the Recycled Water Element of the Regional Urban Water Augmentation Project (RUWAP), a recycled water distribution system being proposed by MCWD; and an Interlake Tunnel between Lake Nacimiento and Lake San Antonio being proposed by the Nacimiento Regional Water Management Advisory Committee.

A portfolio of possible additional water supply projects, called the Monterey Regional Water Supply Program, has been formulated as part of a regional collaborative process to address pending regional water supply shortages and to develop a regionally supported solution. This portfolio currently contains ten water supply projects—spanning the Greater Monterey County and Monterey Peninsula IRWM regions—that have potential to enhance the region's water supplies (note that RUWAP is part of this portfolio). Projects with potential benefits for the Greater Monterey County IRWM region include:

- Regional Urban Water Augmentation Project (RUWAP)
- A Regional Desalination Project for the Monterey Bay Area
- Regional Recycled Water Storage Project
- RUWAP/Castroville Seawater Intrusion Project (CSIP) Expansion

- Monterey County Regional Conservation Program
- Monterey Regional Cogeneration Project

The Monterey Regional Water Supply Program will be implemented in multiple phases. Projects that have potential benefits for the Greater Monterey County IRWM region are described below, along with additional water supply projects proposed for the region including expanded storage at the Salinas Valley Reclamation Plant (SVRP), the Granite Ridge Regional Water Supply Project (included as a proposed project in this IRWM Plan), and the Interlake Tunnel between Lake Nacimiento and Lake San Antonio (also included as a proposed project in this Plan).

Regional Urban Water Augmentation Project

RUWAP is a recycled water distribution system developed by MCWD in cooperation with FORA. The MCWD currently owns, operates and maintains the potable water distribution, wastewater collection, and recycled water distribution systems in their service areas that encompass the City of Marina and the Ord Community. The MRWPCA operates the Regional Treatment Plant (RTP) to treat and discharge wastewater, the Salinas Valley Reclamation Plant (SVRP) to take treated wastewater to tertiary levels, and the regional wastewater interceptor facilities. The SVRP tertiary treatment facility is located approximately two miles north of Marina. Institutional agreements between MCWD and MRWPCA are in place and define the access to recycled water generated by MRWPCA. MCWD owns a contiguous piece of land next to the RTP/SVRP where MCWD will take ownership of the recycled water and responsibility for distribution of the recycled water to urban users within MCWD jurisdiction and, potentially, the Monterey Peninsula.

Tertiary-treated recycled water produced at the SVRP is currently distributed to agricultural irrigators in the Salinas Valley via the Castroville Seawater Intrusion Project. RUWAP consists of a recycled water distribution system to provide up to 3,000 AFY of tertiary-treated disinfected recycled water from MRWPCA's existing SVRP to urban users in the MCWD service area and the Ord Community for municipal irrigation. RUWAP includes a connection to the SVRP, an onsite pump station referred to as the Water Augmentation Pumping Plant (WAPP), a new distribution system consisting of approximately 39,000 linear feet of pipeline within existing roadway rights-of-way, one recycled water storage tank (called the Blackhorse Reservoir) at an existing storage tank site, one intermediate pump station (called the 5th Avenue Pump Station) located in the City of Marina, and pressure reducing valves and appurtenances.

Currently, up to 10,000 AF of the treated effluent from the SVRP is discharged annually via MRWPCA's existing outfall into Monterey Bay. By distributing additional recycled water with RUWAP, discharges of treated effluent to Monterey Bay will be reduced, thus providing a benefit to the adjacent marine environment within the MBNMS, in addition to the potable water offset resulting from the use of recycled water for urban irrigation. There is additional treated water available that will continue to be discharged via the outfall on an annual basis, but seasonal storage is required in order to expand RUWAP and/or CSIP and to maximize recycled water. This seasonal storage of recycled water would be implemented as a separate project as described in a following section.

A Regional Desalination Project for the Monterey Bay Area

The Monterey Peninsula (adjacent IRWM region) needs to replace their current water supply with another water source to stop illegal withdrawals from the Carmel River. A proposed solution is a desalination plant. Desalination has been discussed and studied in Monterey County since the 1980s to augment existing, regional, groundwater and surface potable water supplies. MCWD built and operated a desalination pilot plant in the 1990s; in 1996, MCWRA and MCWD agreed that it would be appropriate for MCWD to plan for and develop new water supplies from reclamation and desalination to meet MCWD's needs; and, Sand City (in adjacent Monterey Peninsula IRWM region) recently developed a small plant to desalinate brackish water.

There have been multiple site proposals for a new desalination facility, though the one with the most traction would be a desalination plant near the city of Marina. Proposed desalination has most recently focused on reverse osmosis (RO) desalination facilities to treat brackish water extracted from the seawater-intruded 180-Foot Aquifer of the Salinas Valley Groundwater Basin to produce about a combined 10 MGD of product water. Intake facilities would include intake wells and a pipeline to convey extracted water to desalination facilities for treatment. A great deal of work has been done by MCWD, MCWRA, and CalAm to develop a plant that has slant wells for the seawater intakes. Desalination facilities would include a pretreatment system, an RO system, a post-treatment system, clearwell tanks, and brine disposal. The proposed plant could utilize the MRWPCA's existing ocean outfall for the brine disposal. At the time of the writing of this report, there is not a definitive solution developed for desalination, though the timeline to provide the alternative water source for the Monterey Peninsula is January 1, 2017.

Expanded Storage at SVRP

This project is a MRWPCA project and is not considered to be part of the Monterey Regional Water Supply Program. As previously mentioned, the SVRP produces recycled water that is distributed to the CSIP for agricultural irrigation during the months of February through October. Wastewater entering the SVRP is treated to meet the requirements of Title 22 for distribution as recycled water. Before being distributed, the recycled water is conveyed to an existing 80-AF storage pond at the southeast corner of the MRWPCA plant site. Storage is required to equalize the supply and demand for recycled water produced at the plant. As it is currently operated, the SVRP shuts down from November to January of each year, when demand from the CSIP system for irrigation purposes is minimal.

The SVRP facility has operational problems at low flows, primarily due to the prolonged storage (detention) time in the basin and the production of algae in the recycled water. To counteract this prolonged detention time and algae production problems, an Engineering Feasibility Study in 2001 evaluated the construction of a 6-AF (2-MG) storage basin at the SVRP site. Such a facility could be used to maximize use of recycled water throughout the year, allowing production, storage and distribution of recycled water from November through February, when the SVRP would otherwise be shut down. Construction of the 2-MG storage basin would supplement the current supply to CSIP and provide a new supply to RUWAP, described above. The first phase of the urban reclamation project would require between 1,727 AFY (with conservation) and 2,077 AFY (without conservation) of recycled water to meet the anticipated urban demand. With the long-term projected CSIP demand at approximately 19,000 AFY, total agricultural and urban water demand from the SVRP/CSIP system would range from 20,727 AFY to 21,077 AFY depending on conservation practices. From November through February, the total demand would range from 1,331 AF (demand without conservation) to 1,318 AF (demand with conservation). It is expected that part of this demand could be met through production and storage of recycled water in the 2-MG storage basin during this period.

Regional Recycled Water Storage Project

Additional seasonal storage, in the form of either surface and/or subsurface storage, is required within the Monterey region in order to maximize use of the recycled water produced at the SVRP. Seasonal storage would consist of storing recycled water produced at the SVRP during winter months for later use during the peak irrigation period by either agricultural and/or urban irrigators. The Regional Recycled Water Storage could be located adjacent to the SVRP or may be located at a distance along the RUWAP and/or CSIP systems. However, regardless of the location or type of seasonal storage developed, this project would allow for the expansion of urban and/or agricultural recycled water use within the Monterey region.

RUWAP/CSIP Expansion

Once the Regional Recycled Water Storage Project is implemented, additional recycled water will be available during peak irrigation months to augment agricultural irrigation via expansion of the CSIP and/or urban recycled water with expansion of RUWAP. Both projects will offset existing potable water supplies derived from groundwater pumping in the Salinas Valley and Seaside Groundwater Basins and/or by Carmel River diversions. Agricultural and urban users have already been identified that would benefit from expanding use of recycled water resulting from expansions of both projects.

Monterey County Regional Conservation Program

The Monterey County Regional Conservation Program would result in conservation savings of up to 1,000 AF over the next three years. Although this savings in water is not considered a new supply source, it can reduce overall demand and the need for additional new potable water supplies. In general, conservation measures to be implemented under this program would include, but are not limited to:

- Water audits for residential, large landscape, and commercial/industrial customers.
- Residential rebates for heavy use appliances including toilets and washers as well as irrigation system equipment and landscape improvements to target reductions in outdoor water usage.
- Residential plumbing retrofits including low-flow showerheads and faucet aerators, leak detection kits, evapotranspiration-based (ETo) irrigation equipment and timers. The ETo controllers would automatically control an outdoor sprinkler system using real-time or historical weather data, utilizing data such as humidity, temperature, solar radiation, soil moisture, and rain gauge sensors.
- Commercial rebates for devices such as high efficiency or dual flush toilets, water-less urinals, waterbrooms, dishwashers, and others.
- School Education Programs targeting grades K-12.
- Implementation of the Expanded Water Conservation and Standby Rationing Plan allowing for mandatory water rationing and conservation during either legal or actual supply shortages, including reductions ranging from 15 percent to 50 percent reduction goals.

Monterey Regional Cogeneration Project

The Monterey Regional Waste Management District (MRWMD) provides integrated waste management services to the greater Monterey Peninsula. Materials that cannot be recycled are deposited in a landfill on MRWMD's 475-acre property, which has capacity to accept solid waste for the next 100 years. Methane gas is produced as a by-product of decomposition of material within the landfill; MRWMD currently captures the methane and uses it as fuel to produce electricity in a 5,000 kW cogeneration facility. As the landfill capacity increases, the MRWMD is evaluating plans to construct an additional 5,000 kW cogeneration plant on the southern side of the landfill site, immediately adjacent to the proposed desalination facilities.

The combined power from both the existing and new cogeneration facilities would be sufficient to provide all of the power needed for operation of the desalination facilities, specifically the desalination water treatment plant and distribution pumping. The power would be delivered to the desalination plant through a new power transmission line running directly from the co-generation facilities to a substation at the regional facilities. This would provide an "over-the-fence" power delivery of up to 10,000 kW for the desalination plant and any adjunct facilities. Powering the regional facilities from the Monterey Regional Cogeneration Project provides the following added benefits:

- Significantly reduced greenhouse gas emissions.
- Reduced carbon footprint for the regional water supply facilities.
- Power potentially provided at a cost lower than buying from PG&E.
- Power will not be required from PG&E on a regular basis. Connection, if any, to PG&E will be for backup only, and so a locally controlled power supply will be created.

Granite Ridge Regional Water Supply Project

The Granite Ridge Regional Water Supply Project is a project being proposed by the MCWRA to alleviate existing water supply and water quality deficiencies in the Granite Ridge area of northern Monterey County. Groundwater is the single source of water supply for the Granite Ridge area and is highly limited due to an underlying granitic formation. The Granite Ridge project will enable MCWRA to provide potable water service in a way that complies with US EPA and CDPH drinking water standards. The Granite Ridge Project will enable MCWRA to improve the reliability of water supply by interconnecting existing smaller systems into a consolidated water supply system with a new groundwater well to improve supply reliability. The project has been developed to meet four objectives:

- *Increase water supply availability:* Water supply availability would be increased through the creation of a new water distribution system that would obtain its water supply from the higher producing alluvium wells of the Salinas Valley East Side subarea. Relocating the supply sources takes advantage of the water supply benefits made available through implementation of the SVWP.
- *Improve reliability of water supplies:* The reliability of water supplies would be improved by pumping from an area with enhanced long-term hydrologic balance between recharge and withdrawal, and interconnecting existing smaller systems into a consolidated water supply system with backup well pumping and storage capabilities.
- *Provide supply meeting drinking water quality standards:* The project would supply potable water that meets drinking water quality standards, thus providing the residents in Granite Ridge with uniform access to improved water quality.
- *Enhance fire protection:* Fire protection would be enhanced by installing system storage, water transmission and fire hydrants meeting North County Fire District requirements.

Interlake Tunnel between Lake Nacimiento and Lake San Antonio

This project proposed by the Nacimiento Regional Water Management Advisory Committee consists of building an interlake tunnel between Lake Nacimiento and Lake San Antonio. With the recent changes in allowed water storage derived from the modification of the Lake Nacimiento dam spillway due to the completion of the SVWP, there has been a renewed interest in capturing all of the rainwater run-off. This past year, despite the increased storage capacity of Lake Nacimiento, tens of thousands of AF of water were released for flood control, ultimately flowing to the ocean. Over the same period Lake San Antonio had a minimum of 20 percent of its storage capacity available—twice what was needed to store the extra runoff from Lake Nacimiento. During the winter season, this tunnel would transfer extra rainwater that would be released, traveling the Salinas River and ending up as “wasted water” in the Pacific Ocean. The water from these two lakes would then be used downstream for groundwater recharge, abatement of saltwater intrusion, and the promotion of fish habitats. Increasing the total available supply of water will benefit all of these uses, industries, and communities.

B.5.5.b Potential Impacts of Climate Change on Water Supply and Demand

Typically, water demand projections are based on past water use along with population projections. However, given climate change as a “new” factor, it may no longer be adequate to simply rely on historical water years when projecting future demand or supply. Local governments, agencies, and organizations in the Greater Monterey County IRWM region are only in the beginning stages of considering and planning for the effects of climate change on water supply, other critical services and infrastructure, and natural resources in the region (though state and federal projects do consider climate change in their reliability assessments, so any region that is connected to such projects will have it factored in to some degree).

The water supply and demand projections provided in this IRWM Plan do not reflect anticipated effects of climate change, since the effects have not yet been well quantified in those terms. As water managers (along with regional scientists, local government agencies, and other key decision-makers) obtain better analytical tools for understanding the specific effects of climate change, the water supply and demand projections in this IRWM Plan will reflect that information. The RWMG will continue to work closely with other community leaders and scientists throughout the state to obtain and refine the tools needed to better understand and plan for the impacts of climate change in the Greater Monterey County region.

In the meantime, the RWMG—with assistance from a Climate Task Force comprised of regional scientists, water managers, and coastal policy professionals—has conducted preliminary climate risk analyses. These analyses indicate the following climate risks to be top priority for the Greater Monterey County IRWM region for considering how to adapt the region's water management systems for climate change impacts:

- ***Decreased water supply*** due to changes in precipitation, more frequent and severe droughts, increased surface and groundwater consumption, and increased seawater intrusion (due to sea level rise affecting coastal aquifers).
- ***Increased flooding and erosion of creeks and rivers*** due to more intense storm events (higher river flow rates), and overburdening of conveyance systems, levees, and culverts.
- ***Coastal inundation of urban development and other land uses, and impacts to river and wetland ecosystems*** *due to changes in rainfall patterns, storm intensity, storm surges (due to increased storm intensity) and sea level rise.*

The RWMG is aware of the following significant impacts that climate change is expected to have on water supply and demand, generally:

- Sea level rise and higher groundwater extraction will lead to increased rates of saltwater intrusion.
- Agricultural water use is expected to increase to offset higher temperatures and evapotranspiration.
- Rangelands are expected to be drier.
- Domestic landscaping water needs will be higher.
- Droughts are expected to be more frequent and severe.
- Average rainfall is expected to change (though at this point it is unclear whether rainfall in the local region will increase or decrease; a decrease will lead to diminished water supplies, but even if it increases, the rainfall may tend toward more sporadic and intense storms, which may not produce the water supply benefits that a more even distribution would provide).
- Climate change will also likely have adverse effects on water quality, which in turn will affect the beneficial uses (habitat, water supply, etc.) of surface water bodies and groundwater in the region. Changes in precipitation may result in increased sedimentation, higher concentrations of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface water bodies.

Please see Section R, Climate Change, for an overview of the most current information and regional activity regarding climate change in the Monterey Bay area.

B.5.6 Water Supply and Demand: Conclusions

Water use in the Salinas Valley Groundwater Basin has significantly outpaced water supply over the past several decades, resulting in overextraction and seawater intrusion. The SVIGSM modeling estimated basin overdraft in 1995 to be approximately 17,000 AFY, with an additional 8,900 AFY of the groundwater supplies affected by seawater intrusion (defined as the average annual rate of subsurface flow from the Monterey Bay into the groundwater aquifers).

Conditions are expected to improve somewhat by 2030, at least in terms of basin overdraft. SVIGSM modeling predicts basin overdraft in the Salinas Valley Groundwater Basin to be approximately 14,000 AFY in 2030, about 3,000 AFY less than baseline (1995) conditions. This improvement is attributed to an expected overall decrease in water use on the order of 20,000 AFY from 1995 to the year 2030: while urban water use is predicted to increase by about 40,000 AFY (totaling 85,000 AFY in 2030), agricultural water use is predicted to decrease by about 60,000 AFY (totaling 358,000 AFY in 2030). The SVIGSM model based the predicted decline in agricultural water use over the 35-year time period on several factors, including increased irrigation efficiencies, changes from high to low water demand crops, and a slight reduction in agricultural land use resulting from conversion to urban uses. It is important to note, however, that the SVIGSM modeling does not take into account the potential impacts of climate change.

The SVIGSM predicts total water use in the year 2030 to be 443,000 AFY. This projection does not take into account environmental water demand. If environmental water needs are factored in, total water demand in the year 2030 will likely be considerably higher than the predicted 443,000 AFY. The RWMG intends to include environmental water needs, as well as the impacts of climate change, in future modeling efforts for the region.

Finally, “water demand” in the region is met not only by ensuring an adequate water supply, but by ensuring adequate water supply infrastructure to meet the storage, treatment, and distribution needs of water users. The IRWM Plan promotes projects that address specific infrastructure needs as well as overall water supply reliability for the region, in terms water conservation projects, water recycling projects, desalination, and other “water supply enhancement” projects. It is the hope and intention of the RWMG that projects developed and funded through the IRWM planning process will, over time, reverse the trend of basin overdraft in the Salinas Valley Groundwater Basin, halt the advance of seawater intrusion, and ultimately help achieve hydrologic balance and water supply reliability for the Greater Monterey County IRWM region.

B.6 WATER QUALITY

This section describes current water quality conditions in the Greater Monterey County IRWM region for surface and groundwater, regional water quality goals and objectives (including Central Coast Basin Plan, Watershed Management Initiative, and specific watershed goals), and current efforts to protect and improve water quality in the IRWM planning region.

B.6.1 Water Quality: Current Conditions

B.6.1.a Surface Waters: Rivers and Waterways

The quality of surface waters in the region is greatly influenced by land use practices. Primary causes of pollutants to surface waters include urban runoff, agricultural runoff, erosion and sedimentation, and septic systems. Erosion is a widespread problem in Monterey County, due in part to the erosive nature of local soils as well as from land use practices (including farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels that increase water velocities and alter the natural sediment balance, and areas that have been denuded of vegetation by fire, overgrazing, or clearing).

The coastal rivers of the Big Sur region, where urban and agricultural land uses are minimal, are generally considered to be of excellent to good water quality. Big Sur rivers, creeks, and coastal waters are primarily affected by erosion and sedimentation (e.g., from roads and construction, and from periodic wildfire events), septic systems located close to the rivers, and trash from park visitors.

The North County portion of the region is comprised of the Monterey County portion of the Pajaro Valley Groundwater Basin that lies within the Salinas River watershed, the Elkhorn Coastal Plain, and the Hilly Area including Prunedale. The North County area has significant erosion problems. The sandy soils and slopes in the interior hills are especially conducive to erosion. This has become more problematic in recent years due to intensified strawberry farming activity, particularly since strawberry farming practices often involve covering the fields in plastic,[36] creating impermeable surfaces for runoff. Cultivation practices particularly in the Elkhorn Highlands and to a lesser extent in the Carneros Creek watershed have led to high erosion/sedimentation rates. There is relatively little urban land use in the North County area, and urban runoff sources are limited to the areas of commercial development and small communities at Moss Landing, Castroville, and Prunedale. However, because of their proximity to water bodies throughout the North County area, such as the Elkhorn Slough and creeks and sloughs tributary to the Elkhorn Slough drainage system, these limited urban uses have the potential to generate significant adverse water quality impacts (excerpted from Monterey County Planning Department 2010b, Section 4.3).

In the Salinas Valley, surface waters are impacted largely by intensive agricultural use (including grazing) and nonpoint source pollutants from urban uses. Salinas Valley surface waters are especially impaired by nitrates, pesticides, toxicity, and pathogens. Nitrate contamination is of particular concern in the Salinas Valley, resulting mainly from the use of nitrogen-based synthetic fertilizers for irrigated agriculture (though elevated nitrate levels also exist near septic systems and wastewater treatment plants). Urban runoff from communities along the Salinas Valley impacts the Salinas River, Salinas Reclamation Ditch, and other tributaries ultimately flowing to the Monterey Bay.

The City of Salinas monitors water quality as part of National Pollutant Discharge Elimination System (NPDES) Phase I requirements. The City of Salinas is the only Phase I Municipal Separate Storm Sewer System (MS4) in the Central Coast Region and is covered by an individual NPDES permit. Cities within the planning region enrolled under the Phase II General Permit for Stormwater Discharges include King City, Soledad, and Marina (the Monterey Regional Stormwater Management Program covers the City of Marina and unincorporated areas in Monterey County).

For a more in-depth discussion of impaired surface waters in the region, see “Impaired Water Bodies and Total Maximum Daily Loads (TMDLs)” in Section B.6.3.a below.

B.6.1.b Estuaries

The following information is excerpted from the *Monterey Bay National Marine Sanctuary Condition Report 2009* (Office of National Marine Sanctuaries, 2009, pp. 72-74).[37]

> Over the past 150 years, human actions have altered the tidal, freshwater, and sediment processes in Elkhorn Slough and its watersheds. Such impacts have substantially changed the water quality

[36] Specifically: Whole fields are covered in plastic for fumigation. During the growing period, only the planting beds are covered; furrows are bare soil.

[37] To see a summary of impacts on the estuarine environment, go to the MBNMS website: http://sanctuaries.noaa.gov/science/condition/mbnms/welcome_est.html

conditions and have increased the levels of pollution and eutrophication in the slough (Elkhorn Slough Tidal Wetland Project Team 2007). Approximately two dozen wetlands comprising nearly 637 acres of estuarine habitats in the Elkhorn watershed are currently behind water control structures and levees. Control structures have caused many sites in Elkhorn Slough to have very restricted tidal exchange, thus resulting in poor water quality conditions, as evident through low dissolved oxygen and elevated levels of organic matter accumulation (ibid.).

A main cause of water and sediment quality degradation is agricultural non-point source pollution (Caffrey 2002; Phillips et al. 2002; ESNERR, NOAA, and CDFG 2009). Relatively high levels of nutrients and legacy agricultural pesticides, such as DDT, have been documented within the Elkhorn Slough wetlands complex, with the highest concentrations measured in areas that receive the most freshwater runoff (ibid.). Pathogens, pesticides, sediments, low dissolved oxygen levels and ammonia have impaired sections of Elkhorn Slough and water bodies adjacent to the slough (Moro Cojo Slough and Moss Landing Harbor). A Central Coast Ambient Monitoring Program (CCAMP) study conducted between 2001 and 2006 showed problematic levels of dissolved oxygen, dissolved inorganic nitrogen, ortho-phosphate, and chlorophyll, and poor water clarity at the mouth of the slough in Moss Landing Harbor (Sigala, Fairey, and Adams 2007). Toxicity due to organophosphate (such as diazinon and chlorpyrifos) and pyrethroid pesticides has been documented in adjacent watersheds (Hunt et al. 2003; Anderson et al. 2006; Phillips et al. 2006), pointing to the potential for similar toxicity problems in Elkhorn Slough.

Use of persistent pesticides for agriculture in the area has been phased out, but high concentrations are still present in the sediment and can become re-suspended by erosion (ESNERR, NOAA, and CDFG 2009). As legacy organochlorines were phased out in the 1970s and 1980s, organophosphate pesticides such as diazinon and chlorpyrifos became widely used, and these pesticides have been found at toxic concentrations in many Central Coast watersheds (Hunt et al. 2003). Pyrethroid pesticides are now increasingly applied along the Central Coast and have been found at toxic concentrations in watershed sediments (Anderson et al. 2006; Phillips et al. 2006). Management efforts by a number of organizations are aimed at reducing inputs of pollutants to estuarine habitats, however, these management activities have yet to show measurable decreases in contaminants in Elkhorn Slough (ESNERR, NOAA, and CDFG 2009).

Water bodies adjacent to the main channel of Elkhorn Slough, including Moro Cojo Slough, Old Salinas River Estuary, and Salinas River Lagoon, are impaired by nutrients and low dissolved oxygen levels. Elkhorn Slough is currently classified as moderately eutrophic (Bricker et al. 2007); however, the report noted concerns for the future based on the susceptibility of the system and predicted nutrient loads (ibid.). Eutrophication can lead to an array of harmful effects including reduction in water quality (specifically low dissolved oxygen levels), fish mortality, and the loss of biodiversity (Cloern 2001), and has been identified by the Millennium Ecosystem Assessment as one of the largest and most dangerous threats to coastal ecosystems in the United States and globally.

B.6.1.c Coastal Marine Waters

Significant surface waters of the Greater Monterey County IRWM region also include the coastal waters that lie immediately offshore the region's boundaries. The Greater Monterey County region lies adjacent to the MBNMS, which spans nearly 300 miles of California coastline. The Sanctuary receives runoff from all of the region's major watershed areas. Offshore areas of the Sanctuary are in relatively good condition, but nearshore coastal areas show a number of problems resulting largely from nonpoint sources of pollution. The following information is excerpted from the *Monterey Bay National Marine Sanctuary*

Condition Report 2009 (Office of National Marine Sanctuaries, 2009, pp. 55-59).[38]

> Pollutants associated with urban development and agricultural cultivation exert pressure on nearshore water quality conditions in the sanctuary. The greatest loads of nutrients and persistent contaminants in the sanctuary are delivered via the rivers that drain heavily cultivated watersheds (Los Huertos, Gentry, and Shennan 2003; CCLEAN 2007).
>
> Certain portions of the nearshore ocean, such as along the Big Sur Coast, are relatively free from direct inputs of watershed based contaminants, compared to areas that drain relatively large human-altered watersheds such as the Salinas and Pajaro (Conley, Hoover, and De Beukelaer 2008). While there is no overall regional trend for changes in pollutant concentrations at coastal confluences of watersheds that drain to the sanctuary, significant increases at some locations are cause for concern (ibid.). Non-point sources flow into rivers that drain to the sanctuary and deliver substantial loads of persistent organic pollutants (e.g., PCBs, PAHs, dieldrin, DDT) to the nearshore environment (CCLEAN 2006). The Central Coast Long-term Environmental Assessment Network (CCLEAN) monitoring program has reported PCB levels that exceed the California Ocean Plan standards and determined that the four largest rivers that drain to Monterey Bay, the Salinas, Pajaro, Carmel, and San Lorenzo Rivers, were the source of most of the PCBs (CCLEAN 2006 and 2007).
>
> Of the 51 water bodies draining directly to the sanctuary that were monitored for impairment, 15 were determined to be impaired by elevated nutrient levels (SWRCB 2006). Sources of nutrients, such as phosphorus, nitrate, and urea, to the nearshore environment include waste products from mammals, runoff from agriculture fields, leaking septic tanks, and sewage discharge systems. Rivers vary in their load contributions relative to different nutrients (CCLEAN 2006). Nitrates from the Pajaro and Salinas Rivers and Tembladero Slough are far greater in comparison to other major rivers that drain to the sanctuary (CCLEAN 2007). …Harmful algal bloom (HAB) events have been linked with freshwater runoff events (Kudela and Chavez 2004). Biotoxins produced by HABs have been shown to accumulate in filter feeders, such as anchovy and mussels, and can cause health effects in nearshore mammals and seabirds that consume tainted prey (Fritz et al. 1992; Scholin et al. 2000; Kreuder et al. 2005).
>
> Although the majority of the sanctuary's nearshore waters generally do not pose risks to human health, there are localized areas and isolated impacts that pose serious health risks. Pollutants present in nearshore waters are absorbed into the tissues of organisms such as mussels and fish. High levels of contaminants such as pesticides and metals can pose a human consumption risk. Toxins (domoic acid and paralytic shellfish poison) are produced by certain algal species and have been observed at levels in Monterey Bay that are potentially harmful to human health via bioaccumulation in the food web (Jester 2008). … Periodic beach warnings and closures, due to the presence of pathogen indicators (*E. coli*, fecal coliform, total coliform, *Enterococcus*) that can cause illness in beach goers, are common at some locations (Ricker and Peters 2006).

B.6.1.d Groundwater Quality

The MCWRA has an existing monitoring program focused on monitoring water supply levels and water quality changes over time. Conditions currently tracked by the MCWRA include: seawater intrusion; nitrate and other groundwater quality conditions; factors influencing basin balance (i.e., data for rainfall, stream flows, reservoir operations, groundwater levels, etc.); and land use and water needs. Two major

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[38] To see a summary of impacts on the nearshore environment, go to the MBNMS website: http://sanctuaries.noaa.gov/science/condition/mbnms/welcome_near.html

water quality problems affecting the Salinas Valley Groundwater Basin are nitrate contamination and seawater intrusion. Note that much of the information below regarding nitrate contamination and seawater intrusion has been excerpted from Technical Memorandums to EPA Region IX from MCWRA, dated July 30, 2010 (MCWRA 2010a and MCWRA 2010b).

Nitrate Contamination

Nitrogen, in the form of nitrate, is the most significant nutrient affecting groundwater quality in the lower Salinas River watershed. The US EPA established the current drinking water standard (DWS) and health advisory level of 45 mg/l NO_3. Levels of nitrate in groundwater that exceed that level pose a threat to human health and to other biological organisms that depend on groundwater. Particularly in rural, private wells, incidence of methemoglobinemia, or blue baby syndrome, appears to be the result of high nitrate levels. Nitrate may also interact with organic compounds to form N-nitrosamines, which are known to cause cancer (Mahler, Colter, and Hirnyck 2007). Many organic compounds could link with nitrate to form N-nitrosamines, including some pesticides. This is potentially significant because wells with high nitrate levels are also sometimes associated with high pesticide levels. Neither the immediate nor the chronic health effects of N-nitrosamines in humans are well understood.

Nitrate contamination in the Salinas Valley was first documented in a report published by AMBAG in 1978. Nitrate may occur naturally in groundwater due to biologic activity or decomposition of geologic deposits, but rarely do natural concentrations exceed the Primary DWS of 45 mg/l NO_3. Nitrate contamination in the Salinas Valley is due primarily to use of nitrogen-based synthetic fertilizers for irrigated agriculture, and commonly occurs in the unconfined and semi-confined aquifers that underlie areas of intense agricultural activity. However, nitrate contamination can also be caused from septic system failures, from wastewater treatment ponds located in floodplains that convey sewage during flood events, and from livestock waste.

Nitrate contamination is present throughout the Salinas Valley in varying concentrations. In 2007, 37 percent of the 152 wells sampled in the Salinas Valley Groundwater Basin showed nitrate levels greater than the maximum DWS of 45 mg/l NO_3, with concentrations highest in the Upper Valley and East Side Subareas. In the Upper Valley Subarea, 68 percent of wells had nitrate concentrations reported at greater than the DWS, with a maximum concentration of 425 mg/L NO_3 and a mean concentration of 90 mg/L $NO_{3;}$ and in the East Side Subarea, 60 percent of wells had nitrate concentrations reported at greater than the DWS, with a maximum concentration of 502 mg/L NO_3 and a mean concentration of 106 mg/L $NO_{3,}$ as shown in the table below (MCWRA 2010a):

Table B-20: 2007 Summary of Nitrate-NO_3 Concentrations for Study Wells in Salinas Valley Basin

Hydrologic Subarea	Number of Wells Sampled	Mean NO_3 (mg/L)	Median Concentration NO_3 (mg/L)	Maximum Concentration NO_3 (mg/L)	Percent of Wells Greater than DWS
Upper Valley	19	90	78	425	68%
East Side	15	106	63	502	60%
Forebay	41	79	54	290	54%
Pressure 180-Foot Aquifer	28	49	20	284	32%
Pressure 400-Foot Aquifer	44	12	3	143	7%
Pressure Deep Aquifer	5	1	1	2	0%
All Locations	152	56	20	502	37%

Source: Technical Memorandum from MCWRA to EPA Region IX, dated July 30, 2010 (MCWRA 2010a)

The MCWRA has documented increasing trends of nitrate levels in the Salinas Valley Groundwater Basin. Three hundred and seventy (370) wells were sampled in 1993, 152 wells were sampled in 2007, and 96 of those wells were sampled in both years. The change in groundwater nitrate concentration in those 96 wells ranged from a maximum 75 mg/L decrease to a maximum 255 mg/L increase. Many nitrate concentrations for wells in the Pressure subarea showed no change in nitrate concentration from 1993 to 2007 (ibid.).

Between 1993 and 2007, the percentage of wells sampled within the Salinas Valley Groundwater Basin with concentrations of NO_3 greater than the DWS increased from 25 percent to 37 percent (ibid.). Significant increases in both mean and median concentrations of NO_3 were also observed, as shown in the table below:

Table B-21: 1993 and 2007 Comparison of Nitrate-NO_3 Concentrations for Study Wells in Salinas Valley Basin

Hydrologic Subarea	Mean NO_3 (mg/L)			Median Concentration NO_3 (mg/L)			Percent of Wells Greater than DWS	
	1993	2007	Mean Change 1993 - 2007	1993	2007	Median Change 1993 - 2007	1993	2007
Upper Valley	96	90	-6	59	78	+19	53%	68%
East Side	70	106	+36	36	63	+27	45%	60%
Forebay	41	79	+38	33	54	+21	36%	54%
Pressure 180-Foot Aquifer	23	49	+26	6	20	+14	14%	32%
Pressure 400-Foot Aquifer	11	12	+1	3	3	0	7%	7%
Pressure Deep Aquifer	1	1	0	1	1	0	0%	0%
All Locations	38	56	+18	13	20	+7	25%	37%

Source: Technical Memorandum from MCWRA to EPA Region IX, dated July 30, 2010 (MCWRA 2010a)

All of the Salinas Valley cities have had to replace domestic water wells due to high nitrate levels that exceed the drinking water standard. In 1988, a report by the SWRCB documented that nitrate levels in the Salinas Valley groundwater had impaired its beneficial use as a drinking water supply. In response to that report an Ad Hoc Nitrate Advisory Committee was formed by the MCWRA to examine nitrate in the Salinas Valley Groundwater Basin and recommend a course of action. Their report was published in 1990 and echoed the concerns and findings of the SWRCB. In a July 1995 staff report, the SWRCB ranked the Salinas Valley as their number one water quality concern due to the severity of nitrate contamination. Development and implementation of a nitrate management program for the Salinas Valley has become a priority for the SWRCB. In 1998, MCWRA convened a Nitrate Technical Advisory Committee (NTAC) to re-evaluate current nitrate management needs. The NTAC recommendations were incorporated into a MCWRA Nitrate Management Program. Eleven of the 13 Nitrate Management Program Elements were implemented as objectives for two Clean Water Act 319(h) grants which concluded in 2002, and some of the program elements have been incorporated into ongoing Agency programs.

Seawater Intrusion

As both irrigated agriculture and urban development have increased during the past several decades, groundwater demand has exceeded available recharge. Seawater intrusion was first observed in a few wells in the Castroville area in 1932, and was documented in Bulletin 52 (DWR 1946). By the 1940s, many agricultural wells in the Castroville area had become so salty that they had to be abandoned. It is estimated that the Salinas Valley Groundwater Basin has an average annual non-drought overdraft of approximately 50,000 AF (Cal Water 2010a), though during the last drought the annual overdraft was estimated at 150,000–300,000 AFY (Cal Water 2010b). As a result of this consistent overdraft, groundwater levels in the Salinas Valley Groundwater Basin have dropped below sea level, allowing seawater to intrude from Monterey Bay into aquifers located 180 and 400 feet below ground surface. The East Side and Pressure Subareas of the Salinas Valley Groundwater Basin are the most impacted by lack of recharge.

Groundwater quality during phase I, early intrusion of seawater, is characterized by increasing chloride and conductivity concentrations. Early intrusion also includes a cation base exchange; there is an exchange of calcium and sodium between the aquifer matrix and intruding seawater. As intrusion proceeds, groundwater is mixed with seawater, trending directly toward seawater quality. Seawater is high in chlorides. Chloride, according to the California Safe Drinking Water Act, has a Secondary DWS upper limit of 500 mg/L. This upper limit indicates drinking water impairment and is used as the benchmark for determining the isocontours used in developing maps of the sweater intrusion front, shown on the following pages. In addition to the fact that chloride concentrations above 500 mg/L impair drinking water, chloride ion concentrations above 350 mg/L are considered to be injurious to plants, according to guidelines for agricultural suitability of irrigation water (Todd Engineers 1989).

In 2011, the total acres overlying the seawater intrusion front in the Pressure 180-Foot Aquifer equaled 28,142 acres, having advanced 351 acres since 2009. The total acres overlying the seawater intrusion front in the Pressure 400-Foot Aquifer in 2011 equaled 12,573 acres, having advanced 476 acres since 2009 (MCWRA website, September 2011). Figures B-22 and B-23 on the following pages illustrate the extent of seawater intrusion in the Salinas Valley. Seawater has intruded approximately seven miles inland in the 180-Foot Aquifer and three miles inland in the 400-Foot Aquifer. As a result of seawater intrusion, urban and agricultural supply wells have been abandoned, destroyed, and relocated. In the past several years there has been an increase in the number of Pressure Deep Aquifer (900-Foot Aquifer) wells that have been drilled in the Castroville coastal area. For this reason MCWRA has begun to sample Pressure Deep Aquifer wells as part of its Coastal Sampling Program. Thus far, the Deep Aquifer is not known to be impacted by seawater intrusion (MCWRA 2010b).

The current land use overlying the intruded aquifers is predominantly agricultural production. Large agricultural wells are owned and operated by the private sector and used for drawing groundwater for irrigation purposes. As noted previously, MCWRA constructed CSIP in the mid-1990s, aimed at providing recycled water to agricultural growers within the seawater intrusion front area. These growers use the recycled water in lieu of pumping groundwater. Since 1998, recycled water deliveries have ranged from approximately 7,500-14,000 AFY. As a result of the CSIP, the seawater intrusion front has slowed, but has not been halted (ibid.). More recently, MCWRA has developed the Salinas Valley Water Project as a means to increase the availability of recycled water, thereby further reducing agricultural pumping from intruded Pressure Subarea Aquifers. Both the CSIP and the Salinas Valley Water Project are described in Section B.6.3.b (Efforts to Improve Groundwater Quality in the Salinas Valley Groundwater Basin) below.

Despite best efforts on the part of water managers and water users in the region to reverse the trend of seawater intrusion, the problem is expected to become worse as a result of climate change in future years. One of the most serious anticipated consequences of climate change for the Monterey Bay region is sea level rise. Sea level rose approximately seven inches (18 cm) over the past century (1900–2005) along most of the California coast (Cayan et al. 2008). Currently, the State of California is using estimates of global sea level rise produced by Rahmstorf (2007) and Cayan et al. (2008) for coastal adaptation planning purposes. These projections suggest possible sea level rise of approximately 14 inches (36 cm) by 2050 and up to approximately 55 inches (140 cm) by 2100. Sea level rise will significantly increase the pressure of saltwater on the coastal Salinas Valley Groundwater Basin aquifers, causing increased seawater intrusion in critical groundwater supplies.

Figure B-22: Seawater Intrusion in the Salinas Valley Groundwater Basin: Pressure 180-Foot Aquifer

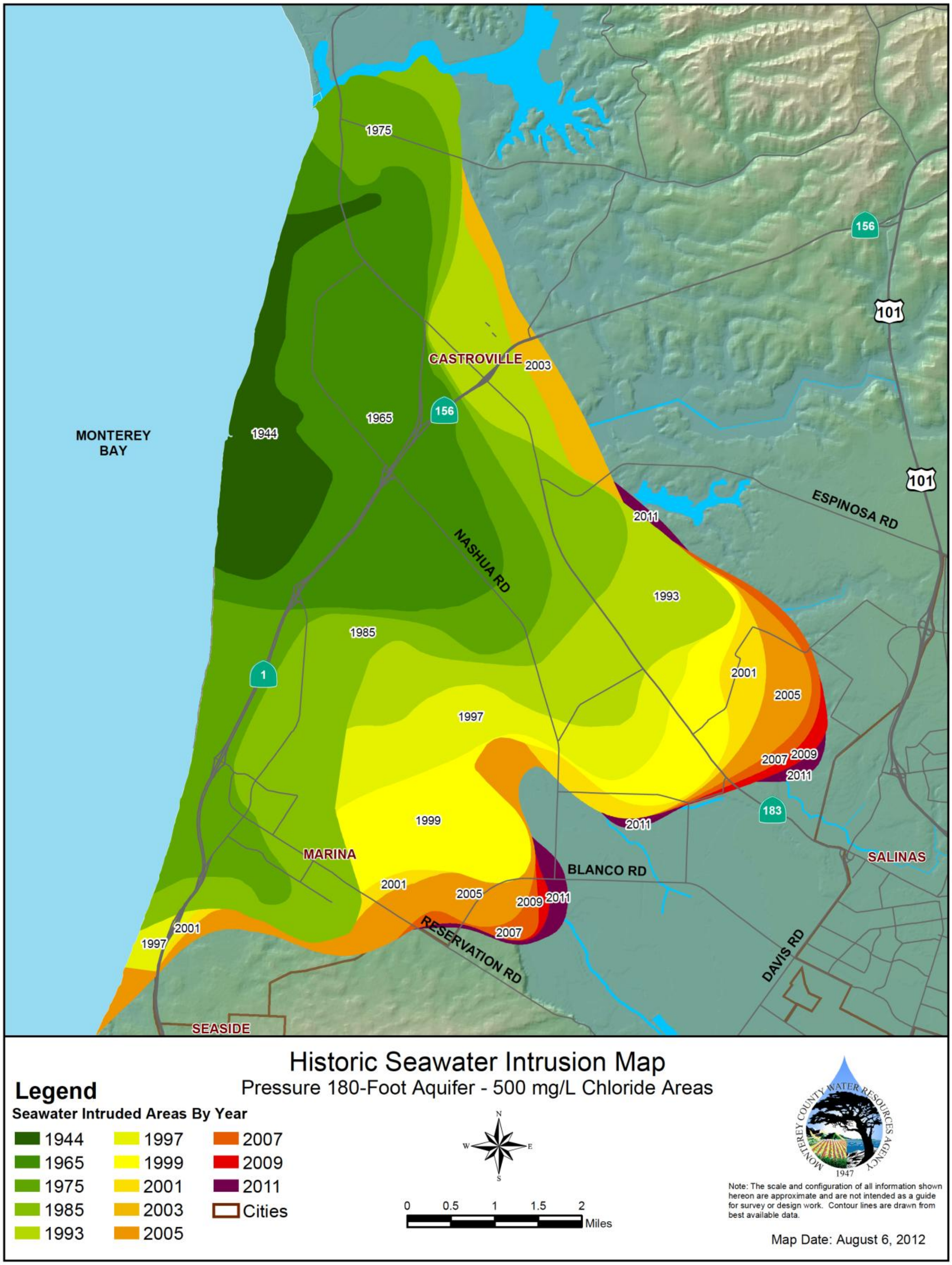
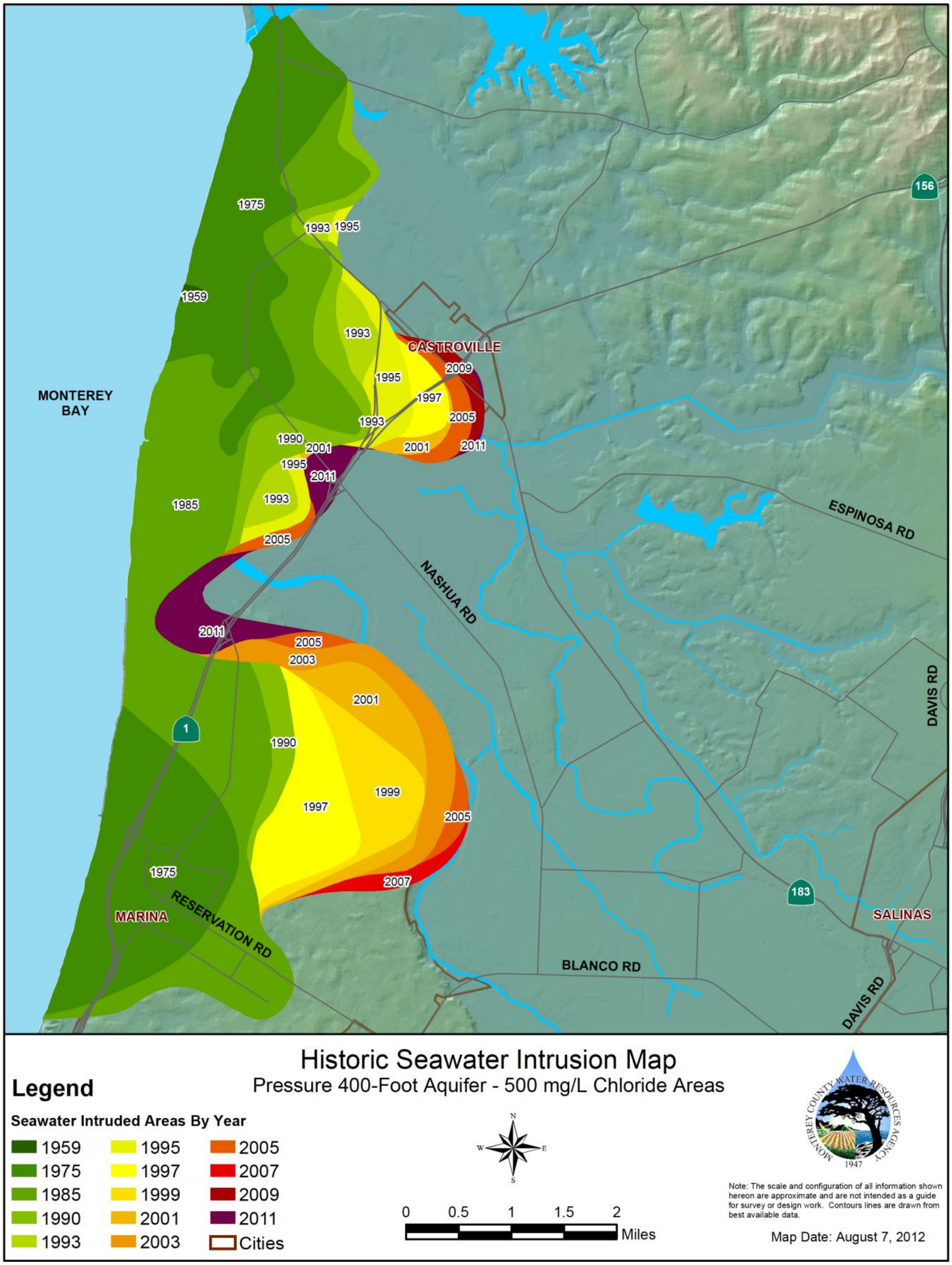


Figure B-23: Seawater Intrusion in the Salinas Valley Groundwater Basin: Pressure 400-Foot Aquifer



B.6.2 Regional Water Quality Goals and Objectives

This section describes regional water quality goals and objectives that have been established on a state level by the Central Coast RWQCB. The water quality goals and objectives that have been established specifically for the Greater Monterey County IRWM region by the RWMG as part of this IRWM planning effort are described in Section D, Objectives.

B.6.2.a Basin Plan Goals

California's Porter-Cologne Water Quality Control Act (1969) establishes the responsibilities and authorities of the State's nine Regional Water Quality Control Boards and the State Water Resources Control Board. The Porter-Cologne Act names the Regional Boards "…the principal State agencies with primary responsibility for the coordination and control of water quality" (Section 13001). Each Regional Board is directed to formulate a water quality control plan for all areas within its region. The Central Coastal Basin Plan is the water quality control plan formulated and adopted by the RWQCB for the Central Coast region (see RWQCB 2011).

The objective of the Central Coastal Basin Plan is to show how the quality of the surface and ground waters in the Central Coast Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists various water uses (Beneficial Uses), then describes the water quality which must be maintained to allow those uses (Water Quality Objectives). The Implementation Plan then describes the programs, projects, and other actions necessary to achieve the standards established in the plan. The RWQCB implements the Basin Plan by issuing and enforcing waste discharge requirements to individuals, communities, or businesses whose waste discharges can affect water quality. These requirements can be either State Waste Discharge Requirements for discharges to land, or federally delegated NPDES permits for discharges to surface water. The Basin Plan is also implemented by encouraging water users to improve the quality of their water supplies, particularly where the wastewater they discharge is likely to be reused.

The Central Coast RWQCB has established the following planning goals for water quality in the Central Coast Region (p. IV-2):

1. Protect and enhance all basin waters, surface and underground, fresh and saline, for present and anticipated beneficial uses, including aquatic environmental values.
2. The quality of all surface waters shall allow unrestricted recreational use.
3. Manage municipal and industrial wastewater disposal as part of an integrated system of fresh water supplies to achieve maximum benefit of fresh water resources for present and future beneficial uses and to achieve harmony with the natural environment.
4. Achieve maximum effective use of fresh waters through reclamation and recycling.
5. Continually improve waste treatment systems and processes to assure consistent high quality effluent based on best economically achievable technology.
6. Reduce and prevent accelerated (man-caused) erosion to the level necessary to restore and protect beneficial uses of receiving waters now significantly impaired or threatened with impairment by sediment.

B.6.2.b Watershed Management Initiative Goals

Each of the nine RWQCBs in the state is responsible for developing a Watershed Management Initiative (WMI) Chapter as part of the State's five-year Strategic Plan for water resource protection. Together the nine Chapters constitute the State's Watershed Management Initiative Integrated Plan. The aim of the

WMI is to plan and prioritize activities within and amongst watersheds; integrate various surface and groundwater regulatory programs; promote local, collaborative efforts; and focus limited resources on priorities.

In the WMI, the Central Coast RWQCB outlines water quality priorities for the region, identifies priority watersheds and water quality issues, describes watershed management strategies. The WMI includes the following Water Quality Priorities (RWQCB 2002, List D-7 from the 2004 Update, Appendix D):

- Agriculture: Addressing water quality impacts from irrigated agriculture, a major land use in the region that has been identified as a potential source of impairment for many of the water bodies on the 303(d) list (constituents of concern include nutrients, pesticides and sediment) by implementing the conditional waiver for irrigated lands.
- Total Maximum Daily Loads: Developing and implementing TMDLs throughout the region.
- Urban Runoff: Addressing beach closure issues, implementing Phase II of the NPDES Stormwater Program.
- Point Source Regulatory Programs: Streamlining permit writing, renewing major permits and several existing Waste Discharge Requirements, performing inspections.
- Basin Planning: Developing a riparian corridor policy, revising or developing water quality objectives.
- Monitoring: Maintaining the Central Coast Ambient Monitoring Program, integrating data from the agricultural cooperative monitoring program.
- Clean-up: Overseeing perchlorate, MTBE, military base, hazardous waste, and underground storage tank cleanups.

As part of the WMI planning process, the RWQCB has identified nine priority watersheds. Two watersheds within the Greater Monterey County IRWM region are included on that list: the Salinas River watershed and the Elkhorn Slough, with the Salinas River watershed being targeted as a "highest priority watershed." Pollutants of concern in the Salinas River watershed include seawater intrusion, nitrates and minerals in groundwater, nutrients, pesticides, heavy metals, and sedimentation. Water quality problems include overpumping of groundwater, agricultural activities, urban development and runoff, past mineral mining, and gravel mining. The primary water quality concerns in the Elkhorn Slough watershed include erosion, pesticides, bacteria and scour. Many of these water quality concerns are generated from surrounding agricultural activities. Several Moss Landing Harbor activities, including ongoing dredging, impact the slough at its confluence with the harbor.

Table D-7 in the WMI Appendix D (updated 2004) lists the following Targeted Projects and Activities for the Salinas River and Elkhorn Slough watersheds as well as Central Coast region-wide efforts (the Table includes the other seven priority watersheds as well):

Region-wide:

1. Projects that support implementation of the Conditional Waiver for Irrigated Lands ("agricultural waiver"), including:
    a. Projects that support implementation of the Cooperative Monitoring Program
    b. Projects that support development and implementation of farm water quality management plans for irrigated operations to address irrigation management, nutrient management, pesticide management and erosion control
    c. Projects that implement and test the effectiveness of management practices
2. Projects that implement approved or developed TMDLs (see below)

3. Projects that support development of scheduled TMDLs

<u>Salinas Watershed:</u>
1. Agricultural waiver implementation (monitoring, education, BMP implementation)
2. Riparian and wetland protection and restoration
3. Urban runoff reduction/increase infiltration

<u>Elkhorn Slough Watershed:</u>
1. Agricultural waiver implementation (monitoring, education, BMP implementation)
2. Riparian and wetland protection and restoration

B.6.2.c Water Quality Goals and Objectives for Watersheds in the Region

Watershed assessments and management plans have been completed to varying extents for several watersheds in the region, including the San Antonio River and Nacimiento River watersheds in the southern portion of the region (and northern San Luis Obispo County), Garrapata Creek watershed in Big Sur, and the Elkhorn Slough watershed, Moro Cojo Slough watershed, and Reclamation Ditch/Gabilan watershed area, all of which are located in the northern Salinas Valley. A watershed management plan for the Big Sur River watershed has recently been initiated by the Monterey County RCD with a grant from the California Department of Fish and Game (September 2012). The plan will be developed through a stakeholder-driven process, with completion expected within about 18 months.

The section below briefly summarizes the watershed goals and objectives resulting from each of the existing watershed management planning efforts, along with recommended actions.

San Antonio and Nacimiento Rivers Watershed Management Plan: The *San Antonio and Nacimiento Rivers Watershed Management Plan*—a watershed management plan for the combined San Antonio River and Nacimiento River watersheds—was developed by the Nacimiento and San Antonio (Nacitone) Watersheds Steering Committee and Central Coast Salmon Enhancement, Inc. for the MCWRA and the SWRCB in October 2008. Goals and objectives in the plan are organized around 11 issue areas, including: Recreation, Monitoring and Information Needs, Preventing Pollution from Point and Nonpoint Sources, The Role of Agriculture, Fire in the Watersheds, Taking Enforcement Action, Coordination and Communication, Watershed Health: Plants and Animals, Roads and Culverts, Education and Outreach, and Invasive Species. Top priorities that emerged from the stakeholder process include steps to continue the watershed planning process plus the following short-term priority actions (i.e., 1-2 years):

- Monterey County, San Luis Obispo County and resident associations should work together to develop and implement programs to control invasive species.
- Continue existing water quality monitoring. In addition, establish a comprehensive water quality monitoring program with uniform collection, analysis and reporting protocols across pertinent jurisdictions for technical and public sector use. … [As part of the SuperFund site cleanup program,] encourage the US EPA to conduct a lake bottom sediment study of Nacimiento reservoir to better understand mercury contamination.
- Support the work of existing Local Fire Safe Councils.
- Conduct road system survey to prioritize needs for erosion control.
- Collaborate on the design and implementation of educational stewardship campaigns targeting watershed residents and visitors with customized messages such as “Be A Watershed Citizen.”

Garrapata Creek Watershed Assessment and Restoration Plan: The *Garrapata Creek Watershed Assessment and Restoration Plan* was developed by the Garrapata Creek Watershed Council for the

Garrapata Creek Watershed Community and the CDFG in July 2006. The plan focuses on critical issues related to steelhead and invasive species, both as indicators of overall watershed health and as important restoration goals. Specific areas of assessment included: the watershed's hydrologic function and sediment transport; geologic setting; road-produced sediment (erosion issues); the current status of the steelhead population and distribution in the watershed; migration barriers to steelhead in the creeks; the Garrapata Lagoon and its function for steelhead; and the watershed's vegetation composition and the health of the riparian corridor. The keystone limiting factors in the watershed were found to be as follows, in order of importance:

- Sediment delivery to the streams from road erosion in the watershed is causing adverse conditions to Garrapata Creek and tributaries.
- Non-native plant species invasion has restricted riparian habitat and has caused significant negative impacts, including the development of invasive monocultures that impedes the recruitment of native riparian species in the watershed.
- Steelhead migration barriers in the lower reaches of Garrapata Creek and tributaries prevent fish from utilizing all of the habitat available for spawning and rearing.

Goals and objectives were established around each of these limiting factors. Specific recommendations included reducing sediment loading through better road management, improving fish migration, eliminating or reducing non-native plant species, and re-vegetating and stabilizing creek banks with native vegetation. One major restoration opportunity that stood out above all others was reducing sediment delivery to the creeks from unpaved roads. An upslope erosion reduction project was completed in 2010.

Elkhorn Slough Watershed Conservation Plan: This plan was developed for the Elkhorn Slough Foundation and The Nature Conservancy by Scharffenberger Land Planning & Design in 1999. The Conservation Plan was developed to identify critical resources within the Elkhorn Slough watershed, to identify and address threats, and to maintain the long-term viability of Elkhorn Slough and its related upland communities as a significant coastal system. In 2002, a second report was produced based on the Elkhorn Slough Watershed Conservation Plan. *Elkhorn Slough at the Crossroads: Natural Resources and Conservation Strategies for the Elkhorn Slough Watershed* identifies key natural resources of the slough and suggests strategies for conserving them. The proposed vision for the slough includes an intact and interconnected network of natural communities including over 4,000 acres of coastal marsh within Elkhorn Slough and Moro Cojo Slough, enhanced freshwater wetlands of McClusky Slough, a restored stream-side forest along the lower Carneros Creek Floodplain and a series of upland ridges with unfragmented maritime chaparral in the Elkhorn Highlands.

Moro Cojo Slough Management and Enhancement Plan: The *Moro Cojo Slough Management and Enhancement Plan* was developed by The Habitat Restoration Group for the Monterey County Planning and Building Inspection Department and the State Coastal Conservancy in October 1996. The plan includes the following water quality and nonpoint pollution objectives:

1. Identify alternative methods to address water quality problems at the source.
2. Minimize sedimentation and soil erosion through the use of vegetation cover and other erosion control measures.
3. Improve and/or create stormwater detention facilities to protect/enhance water quality of the slough from agricultural and urban runoff.
4. Manage water and drainage to accommodate agricultural uses on adjacent lands.
5. Avoid actions that impact groundwater.
6. Coordinate with mosquito abatement district on measures to minimize impacts to sensitive habitat

features.

7. Develop a monitoring program to evaluate the success of the slough management program.

The RCD of Monterey County has provided considerable assistance to farmers in Moro Coho Slough on winter erosion control, including furrow alignment, furrow and road seeding, irrigation efficiency evaluations, and engineered practices for steep slopes. Engineered practice implementation has included sediment traps, stormwater detention structures, underground outlets, and other pond-type structures.

Northern Salinas Valley Watershed Restoration Plan: The *Northern Salinas Valley Watershed Restoration Plan* was the Final Report of a study entitled, "Nonpoint Pollution in Coastal Harbors and Sloughs of the Monterey Bay Region" prepared by Moss Landing Marine Laboratories and the Watershed Institute for AMBAG in January 1997, and funded under Section 205(j) of the federal Clean Water Act. The plan focuses on the northern Salinas Valley, encompassing all of the water courses that flow from the Gabilan Mountains east of Salinas into Moss Landing Harbor. The plan promotes the restoration of former wetland and riparian areas ("wet corridors") throughout the watershed as the primary means for water quality restoration, with wetlands and riparian areas acting as natural sediment and pollution filters.

Reclamation Ditch Watershed Assessment and Management Strategy: This study, completed in 2005 by the Central Coast Watershed Studies (CCoWS) team of the Watershed Institute at California State University Monterey Bay for MCWRA, focuses on the same geographic area as the Northern Salinas Valley Watershed Restoration Plan – a 157 square-mile watershed with its headwaters in the Gabilan Range and its terminus at a set of tide gates at the entrance to Moss Landing Harbor.[39] Management goals listed in the plan relate to water quality, flood control, parklands, determining fish passage and steelhead presence/absence, special status species protection, mosquito abatement, food safety and agricultural pest control, harbor sedimentation, sustainable water supply, and economic viability. Management actions are listed for each goal. Those specifically related to water quality include:

1. Support the 2004 Conditional Waiver of Agricultural Waste Discharge Requirements developed by the Central Coast RWQCB.
2. Support agricultural discharge source control.
3. Evaluate City of Salinas stormwater (i.e., implement a monitoring program to determine the degree to which City runoff contributes to water quality concerns).
4. Support urban water quality source control (employing appropriate technologies and regulatory instruments for mitigating urban sources of pollution).
5. Implement urban water quality treatment measures, specifically, modify the function of existing urban stormwater detention basins in the City of Salinas to detain magnitude 2-year storms or less (as opposed to 10-year storms or larger).
6. Install vegetated treatment systems, such as constructed wetlands, vegetated furrows, and grassed waterways, to reduce sources of water quality constituents and treat those constituents that are detrimental in waterways. Theses systems should be located and managed so as to minimize risks relating to food safety and agricultural pests.

Relevant to this last strategy, the RCD of Monterey County has tested multiple vegetated treatment systems on land draining into the Salinas River, Elkhorn Slough, the Salinas Reclamation Ditch, and Blanco Drain (between the Salinas River and the Reclamation Ditch).

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[39] Casagrande and Watson 2005. The Final Report is available for download on MCWRA's website: http://www.mcwra.co.monterey.ca.us/Agency_data/RecDitchFinal/RecDitchFinal.htm

B.6.3 Efforts to Improve Water Quality in the Greater Monterey County Region

Efforts to improve water quality throughout the Greater Monterey County IRWM region are being carried out on the federal, state, regional, and local watershed levels through both regulatory and non-regulatory programs, and through collaborative partnerships that involve government agencies, non-profit organizations, research institutions, and private landowners. The following describes some of the major ongoing efforts to protect and improve water quality in the region, while recognizing that many smaller scale water quality improvement projects and monitoring studies, too numerous to describe here, are making great progress toward water quality improvements in the region.

B.6.3.a Regulatory Water Quality Programs

Impaired Water Bodies and Total Maximum Daily Loads

The RWQCBs are responsible for assessing the water quality of all water bodies in their regions. This information is compiled into a statewide Water Quality Assessment, a database that lists water bodies alphabetically by water type (lakes, streams, wetlands, groundwater, etc.) and assesses each water body as having "good," "intermediate," "impaired," or "unknown" water quality. Formally, an impaired water body is one that does not meet water quality standards even after technology based discharge limits on point sources are implemented (i.e., water quality standards are not attainable even with Best Available Treatment/Best Control Technology).

Section 303(d) of the federal Clean Water Act requires each State to maintain a list of impaired water bodies and to develop TMDLs for all impaired water bodies. A TMDL estimates the maximum amount of a pollutant that a water body can receive and still meet water quality standards. A TMDL must be developed for each stressor or pollutant for each water body threatened or impaired. Establishing a TMDL includes gathering data about the sources of the pollutant, including both point and nonpoint sources, and allocating the pollutant loads from the various identified sources. Once a TMDL is established, an implementation plan must be developed to describe how that water body will meet water quality standards.

The Central Coast RWQCB is the State agency responsible for identifying impaired water bodies within the Central Coast region. On August 4, 2010, the SWRCB approved the 2010 Integrated Report, which is California's 2008-2010 Section 303(d) list of impaired waters requiring TMDLs and 305(b) report on the quality of the State's waters, and on November 12, 2010 the Integrated Report was approved by the US EPA.

Within the Greater Monterey County IRWM region, 29 water bodies have been determined by the RWQCB to be impaired under Section 303(d) of the Clean Water Act. These water bodies are shown in Table B-22 and illustrated in Figure B-24 on the following pages. The 2010 California 303(d) List of Water Quality Limited Segments for water bodies within the Greater Monterey County IRWM region is also included as Appendix G, with the identified pollutants.[40]

Impairments are found to occur within the Salinas, Gabilan, and Bolsa Nueva watersheds (no impairments are listed for water bodies in the Big Sur coastal watersheds). The region has 332 miles of impaired rivers (20 rivers/creeks, including over 100 miles of the Salinas River), 2,339 acres of impaired estuaries (mostly Elkhorn Slough with 2,034 acres listed, but also including the Salinas River Lagoon, Moro Cojo Slough, Salinas River Refuge Lagoon, and Old Salinas River Estuary), 79 acres of impaired harbor (Moss

[40] To see the Section 303(d) List of water bodies for all of California, go to the RWQCB's website: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml.

Landing Harbor), and 5,580 acres of impaired lakes/reservoirs (most of which – 5,417 acres – includes San Antonio Reservoir, listed for mercury). Note that Nacimiento Reservoir, which is not located within the Greater Monterey County IRWM region but is an important water supply source for the region, is also listed for mercury and metals (5,736 acres). The entire Salinas Valley Groundwater Basin, which includes four sub-basins, is listed as impaired and as only partially supporting beneficial uses due to nitrate contamination and seawater intrusion (RWQCB 2002, p. 29).

The water bodies in the lower Salinas Valley have some of the worst pollutant impairments on the Central Coast. The Lower Salinas River (from the estuary to Gonzales Road) has the most pollutant impairments identified on the 303(d) list of any other water body on the Central Coast, with 19 impairments. Second is Orcutt Creek in Santa Maria (Santa Barbara County) with 15 impairments, but tied for third are the Salinas Reclamation Ditch and Tembladero Slough, each with 14 pollutant impairments. In addition, the Old Salinas River Channel and Quail Creek are both listed for 11 impairments.[41] More important than the number of pollutant impairments identified are the magnitude of the problems. Each of these water segments is impaired for toxicity and high levels of pesticides, nutrients and indicator bacteria. Moss Landing Harbor, which lies at the bottom of the Salinas Reclamation Ditch (Gabilan) watershed, is listed for 10 pollutant impairments, including pesticides, toxicity, pathogens, and sediment.

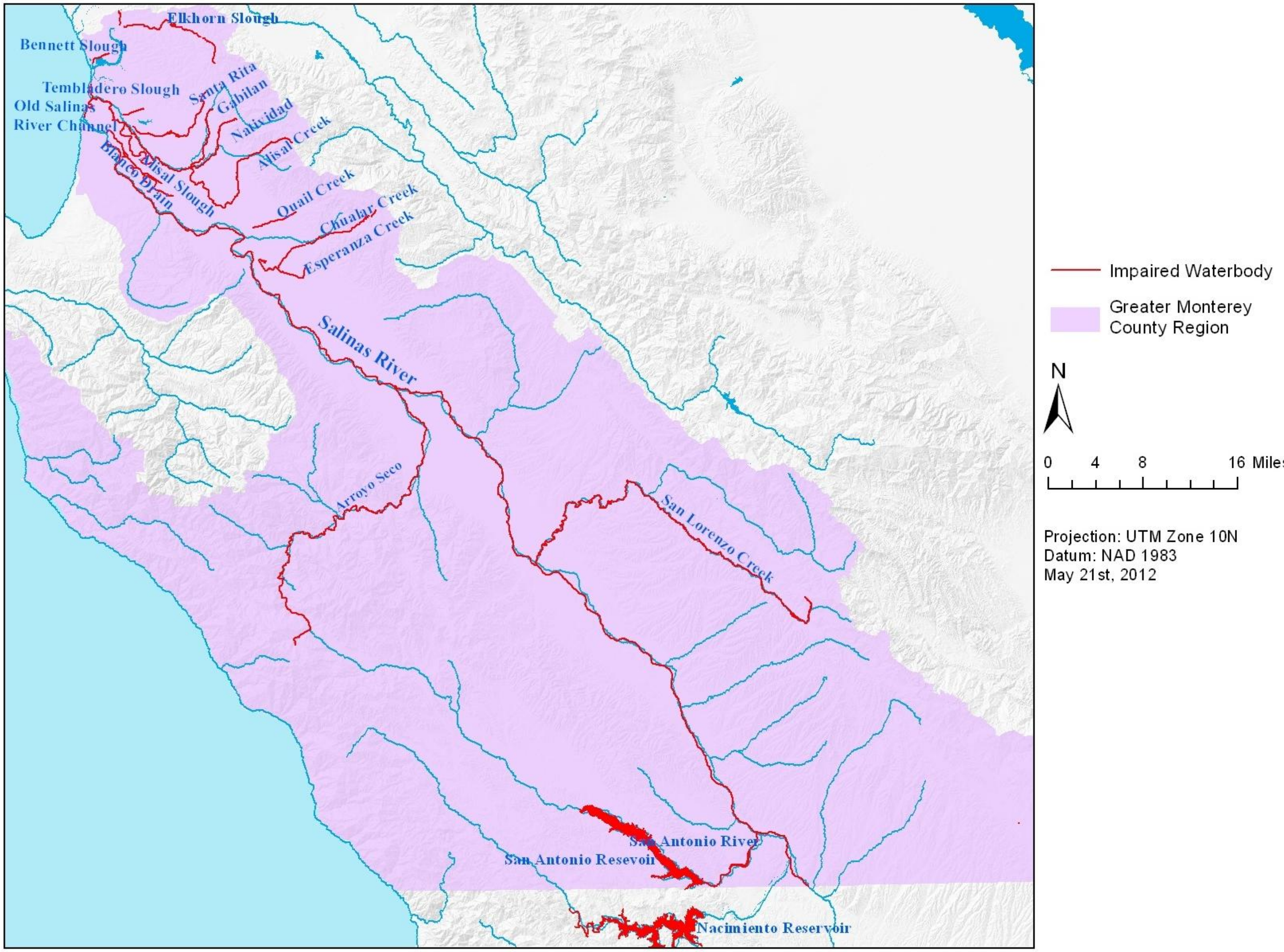
[41] To see the fact sheets for each of these water segments, go to the following link:
http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml

Table B-22: 2010 California 303(D) List of Water Quality Limited Segments in the Greater Monterey County IRWM Region

TO SEE MAP: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

		PESTICIDES							NUTRIENTS					OTHER ORGANICS		SEDIMENT		TOXICITY		PATHOGENS					SALINITY					METALS/METALLOIDS							MISC	
HUC	**Water Body**	pesticides	chlorpyrifos	diazinon	chlordane	DDD	dieldrin	toxaphene	nitrate	chlorophyll-a	ammonia	nutrients	Low dissolved O2	priority organics	PCBs	sediment/ siltation	turbidity	unknown toxicity	sediment toxicity	fecal coliform	total coliform	e coli	pathogens	enterococcus	sodium	salinity	chloride	elec conductivity	TDS	nickel	boron	copper	lead	zinc	mercury	metals	temp	pH
306: Bolsa Nueva	Bennett Slough									x			x																									x
	Carneros Creek									x	x		x				x			x																		x
	Elkhorn Slough	x											x			x					x																	x
	Moss Landing Harbor	x	x	x									x			x			x				x							x								x
309: Gabilan	Alisal Creek								x	x										x					x													
	Alisal Slough								x				x					x	x																			
	Quail Creek		x	x					x		x		x				x	x	x	x		x															x	
	Santa Rita Creek								x		x		x				x			x		x			x													
	Gabilan Creek								x		x						x	x	x	x																		x
	Merrit Ditch								x		x		x				x	x	x																			
	Natividad Creek								x		x		x				x	x	x			x															x	x
	Espinosa Lake		x	x																																		
	Espinosa Slough	x		x					x		x			x			x	x	x																			x
	Salinas Reclamation Canal	x	x	x					x		x		x	x			x	x	x	x		x										x						x
	Tembladero Slough	x	x	x					x	x		x					x	x	x	x	x	x		x														x
309: Lower Salinas	Blanco Drain	x	x	x					x				x				x																					
	Old Salinas River		x	x					x	x			x				x	x	x	x		x																x
	Salinas River, lower	x	x	x	x	x	x	x	x						x		x	x		x		x		x	x		x	x	x									x
	Salinas River Lagoon	x										x																										
	Salinas River Refuge Lagoon																x																					x
(listed as 306 on TMDL list)	Moro Cojo Slough	x									x		x			x					x	x																x
(listed as 306 on TMDL list)	Old Salinas River Estuary	x										x																										
309: Upper/ Middle Salinas	Arroyo Seco River																			x																	x	
	Esperanza Creek								x																													
	Chualar Creek		x	x					x		x						x	x		x		x															x	x
	Salinas River, middle	x															x	x		x		x															x	x
	San Antonio Reservoir																																		x			
	San Antonio River (below res)																			x		x																
	San Lorenzo Creek																			x		x			x		x	x			x							x
(listed as 317 on TMDL list)	Cholame Creek												x							x		x			x		x	x			x							

Figure B-24: Impaired Surface Waters in the Greater Monterey County IRWM Region



Central Coast Irrigated Lands Agricultural Order

Many surface water bodies in the Greater Monterey County region, as well as groundwater, are impaired because of pollutants from agricultural sources. Discharges from agricultural lands include surface discharges (also known as irrigation return flows or tailwater), subsurface drainage generated by installing drainage systems to lower the water table below irrigated lands (also known as tile drains), discharges to groundwater through percolation, and stormwater runoff flowing from irrigated lands. These discharges can affect water quality by transporting pollutants including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals from cultivated fields into surface waters (RWQCB 2012a).

Both regulatory and non-regulatory approaches are being employed in the effort to improve water quality from agricultural sources in the region. In July 2004, the Central Coast RWQCB adopted an order known as the "Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Irrigated Agricultural Order R3-2010-0040)." The Central Coast RWQCB extended the 2004 Agricultural Order multiple times, and on March 15, 2012 voted to adopt an updated Irrigated Lands Order (Order No. R3-2012-0011), replacing the order that was approved in 2004.[42]

The 2012 Irrigated Lands Agricultural Order prioritizes conditions to control pollutant loading in areas where water quality impairment is documented in the 2010 Clean Water Act section 303(d) List of Impaired Waterbodies, and specifically addresses the growing problem of nitrate contamination in the region's drinking water. Nitrate pollution of drinking water supplies is a critical problem throughout the Central Coast Region. More than 23 percent of the municipal drinking water wells sampled in the Salinas Valley area have been found to exceed safe drinking water limits for nitrate (RWQCB 2012b). Studies indicate that fertilizer from irrigated agriculture is the primary source of nitrate pollution in drinking water wells (Carle, Esser, and Moran 2006, as cited in 2012 Agricultural Order). Hundreds of drinking water wells serving thousands of people throughout the region have nitrate levels exceeding the drinking water standard,[43] presenting a significant threat to human health. The Agricultural Order prioritizes conditions to control nitrate loading to groundwater and impacts to public water systems. The Order also prioritizes conditions to address pesticides that are known sources of toxicity and sources of a number of impairments on the 2010 List of Impaired Waterbodies, specifically chlorpyrifos and diazinon.

The Agricultural Order mandates all growers within the RWQCB's jurisdiction who discharge runoff from irrigated agricultural lands to comply with the conditions of the Order. Dischargers are required to implement, and where appropriate update or improve, management practices, which may include local or regional control or treatment practices and changes in farming practices to effectively control discharges, meet water quality standards, and achieve compliance with the Order. Dischargers must also comply with other conditions of the Agricultural Order, including monitoring and reporting requirements. For farms that pose the greatest risk to water quality, growers will be required to develop certified Irrigation and Nutrient Management Plans, Water Quality Buffer Plans if they are adjacent to the most critical creeks, and monitor their individual discharge.

Federal and State Stormwater/Urban Runoff Programs

Urban runoff in California is addressed through both state and federal programs: the State's Nonpoint Source (NPS) Pollution Control Program, and the US EPA's NPDES Stormwater permit program.[44] The

[42] The 2012 Irrigated Lands Agricultural Order can be viewed at:
http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/ag_order.shtml

[43] California Department of Public Health Data obtained using GeoTracker GAMA (Groundwater Ambient Monitoring and Assessment) online database, http://geotracker.waterboards.ca.gov/gama/, as cited in the 2012 Agricultural Order.

[44] Much of this section has been excerpted from the Monterey Regional Storm Water Management Program 2006.

State's NPS Pollution Control Program details how the State will promote the implementation of management measures and BMPs to control and prevent polluted runoff, as required by Section 319 of the federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]). Because of the diffuse nature of polluted runoff, which originates from multiple sources and has a widespread reach, the State's NPS Pollution Control program has emphasized financial incentives, technical assistance, and public education, rather than regulatory activities.

Coastal states are also required to develop programs to protect coastal waters from nonpoint source pollution, as mandated by the federal Coastal Zone Act Reauthorization Amendments (CZARA) of 1990. CZARA Section 6217 identifies polluted runoff as a significant factor in coastal water degradation, and requires implementation of management measures and enforceable policies to restore and protect coastal waters. In lieu of developing a separate NPS program for the coastal zone, California's NPS Pollution Control Program was updated in 2000 to address the requirements of both the CWA section 319 and the CZARA section 6217 on a statewide basis.

In 1972, the CWA was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with an NPDES permit. Although urban nonpoint sources contribute to stormwater runoff, runoff may be channeled into a storm drain and ultimately become a point source. Therefore, stormwater is regulated as a point source under the NPDES permit program.

Phase I of the US EPA's stormwater program was promulgated in 1990 under the CWA. Phase I relies on NPDES permit coverage to address stormwater runoff from: (1) "medium" and "large" MS4s generally serving populations of 100,000 or greater, (2) construction activity disturbing five acres of land or greater, and (3) ten categories of industrial activity. On December 8, 1999, EPA promulgated regulations known as the Stormwater Phase II Final Rule. The Phase II program expanded the Phase I program to include all municipalities within designated urbanized areas, as well as designated small municipalities outside of urbanized areas (generally those with a population of at least 10,000 and/or a population density of at least 1,000 persons per square mile), and operators of small construction sites that disturb between 1-5 acres.

The City of Salinas is the only Phase I MS4 in the Central Coast Region and is covered by an individual NPDES Phase I permit (Order No. R3-2012-0005). Stormwater runoff is generated from various land uses, including urban and agricultural uses, and discharges into the Salinas Reclamation Ditch and the Salinas River. The City's NPDES permit requires the City to reduce the discharge of pollutants in stormwater discharges to the maximum extent practicable (MEP) and protect water quality and beneficial uses. The Order also contains effectiveness assessment measures, including water quality monitoring, detailed BMP assessment requirements, and water quality action levels, designed to provide information about the effectiveness of efforts to reduce pollutant discharges and protect water quality and beneficial uses. In addition, the Order contains requirements for identifying dominant watershed processes that are impacted by stormwater management and are necessary to protect water quality and beneficial uses, and for developing control measures to protect and restore those processes. An emphasis of the Order is on acquiring an understanding of important watershed processes to inform development and stormwater management decisions, and identifying measures for maintaining and restoring watershed processes impacted by stormwater management to protect water quality and beneficial uses that the City will implement in subsequent permit terms (RWQCB 2012d and 2012e).

The City's NPDES Phase I permit was recently renewed (May 3, 2012). The new permit represents the next iterative step in stormwater requirements and includes increased specificity; a blend of water quality monitoring and BMP assessment for evaluating program effectiveness; and commencement of a watershed-based approach to stormwater management (including watershed characterization). Notably, the new permit also includes provisions for the City to pursue IRWM objectives. Specifically, the permit states:

> 3) Aligning Stormwater Management with Related Planning Goals and Requirements
>
> a) Integrated Regional Water Management –
>
> i) Within 12 months of adoption of this Order, the Permittee shall coordinate with other stakeholders to pursue the Environmental Enhancement Objectives of the May 2006 Integrated Regional Water Management Functionally Equivalent Plan Update, or comparable water supply, water quality, and flood protection and flood management goals and objectives of the Integrated Regional Water Management Plan in use, through the Permittee's stormwater management program.
>
> ii) Within 2 years of adoption of the Order, the Permittee shall identify opportunities to protect, enhance, and/or restore natural resources including streams, groundwater, watersheds, and other resources consistent with the Integrated Regional Water Management Plan. At a minimum, the Permittee shall examine opportunities for stormwater capture and reuse, and stormwater infiltration for aquifer recharge. (RWQCB 2012d, p. 86)

The Phase II NPDES Program is intended to address potentially adverse impacts to water quality and aquatic habitat by instituting the use of controls on the unregulated sources of stormwater discharges that have the greatest likelihood of causing continued environmental degradation. Cities within the Greater Monterey County IRWM planning region enrolled under the Phase II General Permit for Stormwater Discharges include King City, Soledad, and Marina.

While King City and the City of Soledad have individual stormwater programs, the City of Marina joined with Monterey County and several Monterey Peninsula cities to apply as co-permittees under a single General Plan, called the Monterey Regional Storm Water Management Program (MRSWMP). The MRSWMP covers the unincorporated areas of Monterey County that have been designated by the U.S. Census Bureau as being "Urbanized Areas" and that are within the County's legal jurisdictional boundary. The purpose of the MRSWMP is to implement and enforce a series of BMPs designed to reduce the discharge of pollutants from the MS4s to the "maximum extent practicable," to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. The BMPs are grouped under the following six "Minimum Control Measures," which are required under the Phase II regulations:

1. Public Education and Outreach
2. Public Participation/Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Runoff Control
5. Post-Construction Runoff Control
6. Pollution Prevention/Good Housekeeping

The Phase II Small MS4 General Permit is currently being renewed, with some significant changes being proposed from the current order (Order 2003-0005-DWQ). The SWRCB considers these changes necessary because audits of Phase II stormwater programs under the existing order have shown that many of these programs lack the specific detail necessary in their stormwater management plans to implement adequate programs (SWRCB 2012). RWQCB staff has found it difficult to determine permittees' compliance with the existing General Permit, due to the lack of specific requirements. They have found that the permit language frequently does not contain specific deadlines for compliance, does not incorporate clear performance standards, and does not include measurable goals or quantifiable targets for implementation. For those reasons, SWRCB staff is amending the current order (Order 2003-0005-DWQ) to include permit language that is clear enough to set appropriate standards and establish required outcomes. The new order will differ significantly from the current order by including the following:

- Specific BMP and Management Measure Requirements
- Eliminate submission of a Stormwater Management Plan (SWMP) for review and approval by the Regional Water Boards
- Electronic filing of Notice of Intents (NOIs) and Annual Reports
- Waiver Certification
- New State Water Board and Regional Water Board designation criteria
- Separate requirements for traditional and non-traditional MS4s
- New program management requirements
- Post-construction storm water management requirements
- TMDL implementation requirements
- Requirements for ASBS discharges
- Water quality monitoring and BMP assessment
- Program effectiveness assessment

The public comment period for the proposed revisions to be incorporated into the renewal ended in July 2012. SWRCB staff expect to submit the final Tentative Order for consideration of adoption by the State Water Board in August or September 2012.[45]

B.6.3.b Voluntary Water Quality Programs

Agriculture Water Quality Alliance (AWQA)

The MBNMS's Water Quality Protection Program (WQPP) has developed six action plans to address water quality problems in Monterey Bay and its watersheds: *Implementing Solutions to Urban Runoff*; *Regional Monitoring, Data Access, and Interagency Coordination*; *Marinas and Boating*; *Agriculture and Rural Lands; Beach Closures and Microbial Contamination*; and *Cruise Ship Discharges*.[46] Each plan contains a set of voluntary strategies to address the water quality problems specific to the plan. The WQPP has been working in partnership with numerous stakeholder groups in the region to implement those strategies.

The *Agriculture and Rural Lands Action Plan* (Ag Plan) was developed with extensive input from agriculture industry groups, resource agencies, and environmental groups. The plan lays out voluntary strategies for protecting water quality and the productivity of Central Coast agricultural lands through a stewardship approach. These strategies fall into six general categories: identification and adoption of more effective management practices through development of industry networks; expansion and coordination of technical assistance/outreach; public education and public relations; regulatory coordination/permit streamlining for conservation measures; improved funding mechanisms and tax incentives; and strategies for public lands and rural roads.

The Agriculture Water Quality Alliance (AWQA) was initiated in 1999 to carry out the strategies of the Ag Plan.[47] AWQA is a unique regional partnership that brings together farmers, ranchers, resource

[45] For current information, visit this link: http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

[46] Summaries of these actions plans can be found in the *Monterey Bay National Marine Sanctuary Final Management Plan* (MBNMS 2008b).

[47] See AWQA website at: http://www.awqa.org/index.html

conservation agencies, researchers, and agricultural and environmental organizations. Since 1999, AWQA partners have worked together to reduce the runoff of sediments, nutrients, and pesticides from agricultural and rural lands through education and outreach, technical and financial assistance, research and monitoring, permit streamlining, and watershed coordination. AWQA's regional approach focuses on industry-led initiatives and voluntary, collaborative solutions to tackling water quality problems, and as such offers an important non-regulatory approach to improving water quality in the region. AWQA partners meet monthly to discuss emerging issues and coordinate projects. The process has led to improved coordination and collaboration of agencies, researchers, non-profits, and industry groups.

With a mix of federal, state, and private funding, AWQA partners have made great strides towards implementing the Ag Plan. Some examples include:

- *Watershed Working Groups:* Through AWQA, farmers and ranchers throughout the region have been establishing management practices on their properties to reduce runoff in the form of sediments, nutrients and pesticides. The Central Coast Agricultural Water Quality Coalition, which represents six County Farm Bureaus whose watersheds drain to the Sanctuary, has been organizing Watershed Working Groups comprised of agricultural landowners and managers along local streams and rivers. These groups work together to identify local water quality issues and implement conservation projects.

- *Irrigation and Nutrient Management Program:* AWQA and a broad suite of partners developed the Central Coast Irrigation and Nutrient Management Program to help farmers implement irrigation and nutrient management practices to address water quantity and water quality concerns in the region. Led by the Central Coast Resource Conservation & Development Council, AWQA has secured millions of dollars in federal financial cost-share assistance under the NRCS Agricultural Water Enhancement Program (AWEP) to support implementation of irrigation and nutrient management practices in Central Coast watersheds. These practices include irrigation system and nutrient management evaluations, improved sprinkler systems, conversion to micro-irrigation, and installation of flow meters, among many others. AWEP is a non-regulatory program; participation is voluntary and confidential.

- *Permit Coordination Programs:* The time, cost, and complexity of navigating the permit process with a host of regulatory agencies can be daunting for landowners seeking to implement conservation projects on their properties. To help farmers, ranchers and other rural landowners overcome these barriers and to encourage implementation of conservation and restoration projects across Sanctuary watersheds, AWQA partners have worked to develop permit coordination programs. Led by Sustainable Conservation, RCDs, and the NRCS, the Partners in Restoration Permit Coordination Programs help landowners to quickly and effectively obtain permits from multiple agencies, and provides technical and cost-share assistance for the installation of certain conservation practices.

- *Education and Outreach:* AWQA developed a Farm Water Quality Planning Short Course through which 70 percent of growers in the region have developed farm water quality management plans for their properties.

- *Confidential Technical and Financial Assistance:* Over the past 10 years the NRCS has assisted growers in the region to voluntarily implement conservation practices through $18M in Farm Bill support dollars, matched by $15M of farmer investment in these same practices.

Central Coast Joint Effort for LID and Hydromodification Control

The Municipal NPDES Stormwater Permit requires municipalities to develop performance measures and, in some cases, numeric criteria to manage stormwater. Development of these measures and criteria requires substantial knowledge of urban hydrologic processes; appropriate use of Low Impact Development (LID) techniques; and an understanding of technical, policy and regulatory issues related to implementing municipal stormwater control requirements. The Central Coast RWQCB is providing municipalities the option of participating in a Joint Effort, led by a consultant team, to develop hydromodification control criteria to meet the Water Board's stormwater regulations for new and redevelopment.

While there are various efforts statewide to develop hydromodification control criteria, the focus has generally been on the large Phase I communities. Compared to the Phase I communities, many Phase II communities are small, have fewer resources, and possess less in-house expertise to develop and implement hydromodification controls. By participating in a joint effort led by subject area experts, municipalities will be assisted in moving forward toward optimal water quality protection. Part 1 of the effort will develop a science-based methodology that municipalities on the Central Coast and across the state can use to determine their own specific hydromodification control criteria. Part 2 of the effort includes the technical and modeling analysis required to determine the actual hydromodification control criteria. Municipalities can then propose these resulting hydromodification control criteria to the Central Coast RWQCB to meet the requirements of their NPDES Municipal Stormwater Permit.[48]

Efforts to Improve Groundwater Quality in the Salinas Valley Groundwater Basin

From the MCWRA's beginning in 1947, projects have been designed and developed to address the seawater intrusion issue in the Salinas Valley. Beginning with construction of the Nacimiento and San Antonio reservoirs in 1957 and 1967, respectively, these projects have generally focused on capturing surface water and utilizing that water more effectively.

- **Monterey County Water Recycling Projects:** In 1983, MCWRA received SWRCB funding to evaluate alternatives that would prevent further seawater intrusion. Numerous studies were conducted between 1983 and 1992 to determine the extent of the seawater intrusion and possible solutions. The results of these studies created a series of projects known as the Monterey County Water Recycling Projects, which are joint efforts between MCWRA and the MRWPCA. Landowners of the Salinas Valley agreed to assess themselves to help fund these multi-million dollar projects, creating the Castroville Seawater Intrusion Project (CSIP)—a water recycling facility at the Regional Treatment Plant and a pipeline distribution system to provide recycled water for agricultural irrigation. The project has successfully addressed a portion of the seawater intrusion problem in the Salinas Valley by providing reclaimed wastewater to approximately 12,000 acres of agricultural land near Castroville. The Monterey County Water Recycling Projects have been in operation since April 1998.

- **Salinas Valley Water Project:** The SVWP is MCWRA's most recent project to address the problem of seawater intrusion, designed to transfer water from its reservoirs in the southern part of the Salinas Valley to the northern portion of the groundwater basin. The SVWP was completed in April 2010 and consisted of two main components, the first being the modification of the spillway at Nacimiento Reservoir, and the second being re-operation of the reservoirs and the construction of an inflatable dam diversion structure. The spillway modifications included lowering of the existing spillway, installation of an inflatable dam on the new spillway, and

[48] For more information on the Central Coast Joint Effort for LID and Hydromodification Control, visit the RWQCB website:
http://www.swrcb.ca.gov/rwqcb3/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml.

enlargement of the spillway chute. The inflatable dam is held in the raised position for normal operations, allowing the reservoir storage to be maintained at its present maximum elevation, and is lowered during large flood events to preclude the dam from overtopping. The second component included the re-operation of the reservoirs and the construction of an inflatable dam diversion structure with associated fish screening and pumping facilities to allow the diversion of Salinas River water into the existing CSIP distribution system. An average of 9,700 AFY of Salinas River is diverted and delivered to the CSIP system, reducing groundwater pumping by the same amount. The water is blended with recycled water, resulting in an improved and more uniform quality of water delivered through the CSIP system. The SVWP also increases groundwater recharge via the Salinas River.

B.6.4 Matching Water Quality to Water Use

Matching water quality to water use is a management strategy used to optimize the efficient use of water supplies. An example of matching water quality to water use is a water supplier choosing to use a deeper, cleaner aquifer for municipal water, which requires less treatment before delivery (resulting in potentially fewer disinfection byproducts and less energy), over a more shallow, more contaminated aquifer. Recycled water can also be treated to a wide range of purities that can be matched to different uses.

In the Greater Monterey County region, water is currently reclaimed and treated for agricultural irrigation purposes. A water recycling facility was constructed at the Regional Treatment Plant in 1998 along with a pipeline distribution system to provide recycled water for agricultural irrigation. The distribution of the recycled water occurs via CSIP. As noted above, the CSIP has successfully addressed a portion of the seawater intrusion problem in the Salinas Valley by providing reclaimed wastewater to approximately 12,000 acres of agricultural land surrounding Castroville, which greatly reduces groundwater extraction for crop irrigation.

In addition, two water suppliers within the region are preparing (or proposing) to use recycled water for municipal landscaping purposes. While the CSIP effort uses almost all the recycled water from the regional generating facility during the summer months, the Marina Coast Water District does have recycled water rights to a small fraction of the summer-time recycled water flows and is proposing to distribute that recycled water to regional golf courses, municipalities, and institutions (e.g., CSUMB) for the irrigation of large landscapes and public common areas. In addition, the City of Soledad is in the process of completing Phase II of the Soledad Water Reclamation Project (with support from Round 1 Proposition 84 IRWM Implementation Grant funds), which includes completion of design of a recycled water delivery system to both agricultural and recreation areas in and near the City of Soledad, and composting municipal sludge for reuse on City landscaping.

The potential exists to treat recycled water to a drinking water standard if the need should arise in the future, though this is not practiced currently.

B.7 MAJOR WATER-RELATED ISSUES AND CONFLICTS

The following list highlights the issues and conflicts related to water resource management that have the most regional significance within the Greater Monterey County IRWM region. This list was developed as a basis for developing the goals and objectives for the Greater Monterey County region for the purpose of IRWM planning (see Section D, Objectives).

The list of issues and conflicts was developed in several stages. A committee comprised of RWMG members was formed in May 2009 to investigate and identify the region's issues and conflicts. The committee interviewed 43 local experts in the areas of water quality, water supply, flood control, natural resources, and public health and safety. Based on those interviews, the committee developed a summary list of water-related issues and conflicts in the Greater Monterey County IRWM region. The list was expanded at a RWMG brainstorming session, and then presented to stakeholders for input at two public workshops held in Big Sur and Soledad in September 2009. After incorporating stakeholder input, a final list of "issues and conflicts" – outlined below – was approved by the RWMG in October 2009.

Water Quality

- Drinking water quality impairments, particularly in small communities in North and South County (including both private and municipal wells)
- Groundwater quality impairments due to seawater intrusion
- Surface and groundwater quality impairments due to runoff (agricultural and urban sources, including municipal outflows/stormwater), including:
  - Nitrates and other nutrients from agriculture, livestock management, septic system failures, and urban sources
  - Sediment (due to land use practices, including construction, agricultural practices, and poorly constructed/maintained roads)
  - Pesticides
  - Metals (e.g., mercury, arsenic, chromium, copper, zinc)
  - Bacteria
  - Salts
  - Trash
  - Unknown impairments in surface waters and ocean from emerging pollutants such as pharmaceuticals, personal hygiene products, etc.
- Agricultural food safety issues impacting water quality
- Impacts to marine environment
- Data gaps as outlined in the Strategic Plan for Central Coast Water Quality Monitoring Coordination and Data Synthesis (e.g., long-term data sets for trend analysis, improved dissemination of data results)
- Public recreation vs. water quality in reservoirs and rivers/creeks
- Challenges for small water system managers in complying with water quality regulations
- Need for increased public education about water quality issues
- Need for more enforcement of existing water quality regulations
- Lack of effective incentive structure (including economically feasible management practices) for protecting water quality from agricultural runoff

Water Supply

- Water supply problems associated with water quality impairments, particularly:
  - Seawater intrusion
  - Nitrates
- Problems with water storage and conveyance infrastructure (inadequate, leaky, or otherwise defective water systems, particularly in regard to small water systems)
- Overconsumption/overdraft
  - Irrigation
  - Municipal supplies (including landscaping)
- Water supply unreliable in certain areas, particularly in small communities
- Need/opportunities for increased water conservation (including gray water re-use, rainwater catchment)
- Environmental water needs (fisheries, wildlife)
- Drought management
- Need for increased public education about water supply issues

Watershed Management and Flood Management

- Data gaps (need for overall watershed resource assessments)
- Need for monitoring programs to assess effectiveness of projects and/or policies
- Regulatory and intergovernmental issues:
  - Interagency coordination
  - Conflicting mandates and regulations
  - Problems with regulatory compliance
  - Inconsistent enforcement of regulations
- Stormwater management/municipal drainage
- Impacts of wildfires (including water supply and water quality, debris flows)
- Need to protect and restore functioning watersheds
- Conflicts regarding flood control projects (particularly in regard to Salinas River Channel maintenance programs)
- Need to better educate rural landowners about land management/development practices that affect water resources)

Environmental Resources

- Hydrologic modifications of wetlands, streams, estuaries and lagoons impact the preservation and quality of habitat by affecting circulation (water quality), habitat structure (geomorphology), and the exchange of energy and nutrients.
- Food safety issues impacting wildlife and habitat protection
- Steelhead, specifically:
  - Sustaining flows
  - Fish passage
  - Habitat (including problems caused by erosion and invasive species, e.g., sticky eupatorium weed)
- Other special status species:
  - Protection
  - Habitat restoration
- Data gaps (while noting stakeholder concern for potential “regulatory creep” with collection of new data), including especially:
  - Surface water quality
  - Sources of erosion (especially in Big Sur)
  - Environmental water needs
- Invasive species (i.e., Arundo, Cape ivy, zebra mussels)
- Upland riparian habitat

Climate Change

- Anticipated changes in rain patterns and intensity adding to the uncertainty of water supply and to creek instability
- Potential impacts from sea level rise and storm surges on coastal aquatic resources and water infrastructure
- Exacerbation in saltwater intrusion in groundwater basin from sea level rise
- Anticipated increase in number and severity of wildfire events, with subsequent erosion and water quality problems
- Potential increase in flooding due to climate change

Disadvantaged Communities

- Water quality and water supply reliability problems in certain small communities
- Inadequate wastewater treatment in some disadvantaged communities
- Need for increased public education in disadvantaged communities

- Flood impacts from small and large watersheds

Miscellaneous

- Need for increased academic training and job recruitment in local water resource management sectors